CRS-170A

L-Band 1:1 Redundancy Switch
Installation and Operation Manual

Accessory Product for use only with Comtech EF Data
CDM-625/A, CDM-840, CDM-750, CDM-760, CDM-570L, CDM-700, CDM-710,
CDM-710G, CDM-600L (CLM-9600L), and SDM-300L3 Modems
(Modem Firmware and Hardware Requirements Apply)

IMPORTANT NOTE: The information contained in this document supersedes all previously published information regarding this product. Product specifications are subject to change without prior notice.

Part Number MN/CRS170A.IOM Revision 10

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Comtech EF Data, 2114 West 7th Street, Tempe, Arizona 85281 USA, 480.333.2200, FAX: 480.333.2161

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PREFACE

About this Manual

This manual provides installation and operation information for the Comtech EF Data CRS-170A L-Band 1:1 Redundancy Switch. This is a technical document intended for the persons responsible for the operation and maintenance of the CRS-170A and its supported modems.

Related Documents

- *Comtech EF Data CDM-625A Advanced Satellite Modem Installation and Operation Manual (CEFD P/N MN-CDM625A)*
- *Comtech EF Data CDM-625 Advanced Satellite Modem Installation and Operation Manual (CEFD P/N MN-CDM625)*
- *Comtech EF Data CDM-840 Remote Router Installation and Operation Manual (CEFD P/N MN-CDM840)*
- *Comtech EF Data CDM-750 Advanced High-Speed Trunking Modem Installation and Operation Manual (CEFD P/N CDM-750)*
- *Comtech EF Data CDM-760 Advanced High-Speed Trunking Modem Installation and Operation Manual (CEFD P/N CDM-760)*
- *Comtech EF Data CDM-570/CDM-570L/CDMR-570L Satellite Modem Installation and Operation Manual (CEFD P/N MN/CDM570L.IOM)*
- *Comtech EF Data CDM-700 Satellite Modem Installation and Operation Manual (CEFD P/N MN/CDM700.IOM)*
- *Comtech EF Data CDM-710 Broadcast Satellite Modem Installation and Operation Manual (CEFD P/N CDM710.IOM)*
- *Comtech EF Data CDM-710G Satellite Modem Installation and Operation Manual (CEFD P/N MN-CDM710G)*

- *Comtech EF Data CDM-600L Satellite Modem Installation and Operation Manual (CEFD P/N MN/CDM600L.IOM)*
- *Comtech EF Data CLM-9600L Open Network Satellite Modem Installation and Operation Manual (CEFD P/N MN/CLM9600L.IOM)*
- *Comtech EF Data SDM-300L3 Satellite Modem Installation and Operation Manual (CEFD P/N MN/SDM300L3.IOM)*

Conventions and References

Patents and Trademarks

See all of Comtech EF Data's Patents and Patents Pending at http://patents.comtechefdata.com.

Comtech EF Data acknowledges that all trademarks are the property of the trademark owners.

Warnings, Cautions and Notes

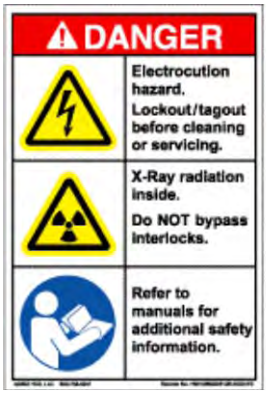
A <u>WARNING</u> informs you about a possible hazard that MAY CAUSE DEATH or SERIOUS INJURY.

A <u>CAUTION</u> informs you about a possible hazard that MAY CAUSE INJURY or PROPERTY DAMAGE.

A <u>NOTE</u> gives you important information about a task or the equipment.

A <u>REFERENCE</u> directs you to additional information about a task or the equipment.

Examples of Multi-Hazard Notices


DANGER
Electrocution hazard. Lockout/tagout before cleaning or servicing.
X-Ray radiation inside.
Do NOT bypass interlocks.
Refer to manuals for additional safety information.

DANGER
Electrocution hazard. Lockout/tagout before cleaning or servicing.
X-Ray radiation inside. Do NOT bypass interlocks.
Refer to manuals for additional safety information.

Recommended Standard Designations

The new designation of the Electronic Industries Association (EIA) supersedes the Recommended Standard (RS) designations. References to the old designations may be shown when depicting actual text (e.g., RS-232) displayed on front panel menus, Web Server pages, serial remote interfaces, Telnet Command Line Interfaces (CLIs), or unit rear panels. All other references in the manual refer to EIA designations.

The user should carefully review the following information.

Safety and Compliance

Electrical Safety and Compliance

The unit complies with the **EN 60950 Safety of Information Technology Equipment (Including Electrical Business Machines)** safety standard.

The equipment is rated for operation at ±12 volts DC. It has a maximum power consumption of 4.5 Watts, and draws a maximum of 250 mA at +12 volts DC and 120 mA at -12 volts DC. The power supply current is, in all circumstances, supplied by either a single Comtech EF Data modem, or a pair of these modems.

IF THE UNIT IS OPERATED IN A VEHICLE OR MOVABLE INSTALLATION, MAKE SURE THE UNIT IS STABLE. OTHERWISE, EN 60950 SAFETY IS NOT GUARANTEED.

Operating Environment

DO NOT OPERATE THE UNIT IN ANY OF THESE EXTREME OPERATING CONDITIONS:

- ***AMBIENT TEMPERATURES LESS THAN 0° C (32° F) OR MORE THAN 50° C (122° F).***
- ***PRECIPITATION, CONDENSATION, OR HUMID ATMOSPHERES OF MORE THAN 95% RELATIVE HUMIDITY.***
- ***UNPRESSURIZED ALTITUDES OF MORE THAN 2000 METRES (6561.7 FEET).***
- ***EXCESSIVE DUST.***
- ***FLAMMABLE GASES.***
- ***CORROSIVE OR EXPLOSIVE ATMOSPHERES.***

Equipment Connection

THE CRS-170A IS DESIGNED FOR OPERATION ONLY WITH THE COMTECH EF DATA PRODUCTS LISTED IN THIS MANUAL UNDER 'RELATED DOCUMENTS'. THESE PRODUCTS SUPPLY DC OPERATING CURRENT (ELECTRONICALLY FUSED AND PROTECTED) AND CONTROL SIGNALS FOR THE CORRECT FUNCTIONING OF THIS SWITCH. CONNECTION TO OTHER MANUFACTURERS' EQUIPMENT COULD RESULT IN DAMAGE TO THE SWITCH. THE CRS-170A IS NOT COMPATIBLE WITH OTHER COMTECH EF DATA MODEMS OR PRODUCTS NOT LISTED IN THIS MANUAL.

European Union Radio Equipment and Telecommunications Terminal Equipment (R&TTE) Directive (1999/5/EC) and EN 301 489-1

Independent testing verifies that the unit complies with the European Union R&TTE Directive, its reference to EN 301 489-1 (***E****lectromagnetic compatibility and* ***R****adio spectrum* ***M****atters [ERM];* ***E****lectro****M****agnetic* ***C****ompatibility [EMC] standard for radio equipment and services, Part 1: Common technical requirements)*, and the Declarations of Conformity for the applicable directives, standards, and practices that follow:

European Union Electromagnetic Compatibility (EMC) Directive (2004/108/EC)

- **Emissions: EN 55022 Class B** – Limits and Methods of Measurement of Radio Interference Characteristics of Information Technology Equipment.
- **Immunity: EN 55024** – Information Technology Equipment: Immunity Characteristics, Limits, and Methods of Measurement.
- **EN 61000-3-2** – Harmonic Currents Emission
- **EN 61000-3-3** – Voltage Fluctuations and Flicker.
- **Federal Communications Commission Federal Code of Regulation FCC Part 15, Subpart B.**

TO ENSURE THAT THE UNIT COMPLIES WITH THESE STANDARDS, OBEY THESE INSTRUCTIONS:

- Use coaxial cable that is of good quality (e.g., RG58/U (50Ω) or RG59/U (75Ω)) for connections to the IF Tx and Rx (transmit and receive) BNC female connectors.
- Use Type 'D' connectors that have back-shells with continuous metallic shielding.

  Type 'D' cabling must have a continuous outer shield (either foil or braid, or both). The shield must be bonded to the back-shell.

- Operate asll products with their covers on at all times.

European Union Low Voltage Directive (LVD) (2006/95/EC)

Symbol	Description
<HAR>	Type of power cord required for use in the European Community.
	CAUTION: **Double-pole/Neutral Fusing** ACHTUNG: **Zweipolige bzw. Neutralleiter-Sicherung**

International Symbols			
Symbol	**Definition**	**Symbol**	**Definition**
	Alternating Current		Protective Earth
	Fuse		Chassis Ground

For additional symbols, refer to Warnings, Cautions and Notes listed earlier in this Preface.

European Union RoHS Directive (2002/95/EC)

This unit satisfies (with exemptions) the requirements specified in the European Union Directive on the Restriction of Hazardous Substances in Electrical and Electronic Equipment (EU RoHS, Directive 2002/95/EC).

European Union Telecommunications Terminal Equipment Directive (91/263/EEC)

In accordance with the European Union Telecommunications Terminal Equipment Directive 91/263/EEC, do not directly connect the unit to the Public Telecommunications Network.

CE Mark

Comtech EF Data declares that the unit meets the necessary requirements for the CE Mark.

Product Support

For all product support, please call:

+1.240.243.1880

+1.866.472.3963 (toll free USA)

Comtech EF Data Headquarters

http://www.comtechefdata.com

Comtech EF Data Corp.

2114 West 7th Street

Tempe, Arizona USA 85281

+1.480.333.2200

Warranty Policy

Comtech EF Data products are warranted against defects in material and workmanship for a specific period from the date of shipment, and this period varies by product. In most cases, the warranty period is two years. During the warranty period, Comtech EF Data will, at its option, repair or replace products that prove to be defective. Repairs are warranted for the remainder of the original warranty or a 90 day extended warranty, whichever is longer. Contact Comtech EF Data for the warranty period specific to the product purchased.

For equipment under warranty, the owner is responsible for freight to Comtech EF Data and all related customs, taxes, tariffs, insurance, etc. Comtech EF Data is responsible for the freight charges only for return of the equipment from the factory to the owner. Comtech EF Data will return the equipment by the same method (i.e., Air, Express, Surface) as the equipment was sent to Comtech EF Data.

All equipment returned for warranty repair must have a valid RMA number issued prior to return and be marked clearly on the return packaging. Comtech EF Data strongly recommends all equipment be returned in its original packaging.

Comtech EF Data Corporation's obligations under this warranty are limited to repair or replacement of failed parts, and the return shipment to the buyer of the repaired or replaced parts.

Limitations of Warranty

The warranty does not apply to any part of a product that has been installed, altered, repaired, or misused in any way that, in the opinion of Comtech EF Data Corporation, would affect the reliability or detracts from the performance of any part of the product, or is damaged as the result of use in a way or with equipment that had not been previously approved by Comtech EF Data Corporation.

The warranty does not apply to any product or parts thereof where the serial number or the serial number of any of its parts has been altered, defaced, or removed.

The warranty does not cover damage or loss incurred in transportation of the product. The warranty does not cover replacement or repair necessitated by loss or damage from any cause beyond the control of Comtech EF Data Corporation, such as lightning or other natural and weather related events or wartime environments.

The warranty does not cover any labor involved in the removal and or reinstallation of warranted equipment or parts on site, or any labor required to diagnose the necessity for repair or replacement.

The warranty excludes any responsibility by Comtech EF Data Corporation for incidental or consequential damages arising from the use of the equipment or products, or for any inability to use them either separate from or in combination with any other equipment or products.

A fixed charge established for each product will be imposed for all equipment returned for warranty repair where Comtech EF Data Corporation cannot identify the cause of the reported failure.

Exclusive Remedies

Comtech EF Data Corporation's warranty, as stated is in lieu of all other warranties, expressed, implied, or statutory, including those of merchantability and fitness for a particular purpose. The buyer shall pass on to any purchaser, lessee, or other user of Comtech EF Data Corporation's products, the aforementioned warranty, and shall indemnify and hold harmless Comtech EF Data Corporation from any claims or liability of such purchaser, lessee, or user based upon allegations that the buyer, its agents, or employees have made additional warranties or representations as to product preference or use.

The remedies provided herein are the buyer's sole and exclusive remedies. Comtech EF Data shall not be liable for any direct, indirect, special, incidental, or consequential damages, whether based on contract, tort, or any other legal theory.

Notes:

Chapter 1. INTRODUCTION

1.1 Overview

Figure 1-1. CRS-170A L-Band 1:1 Redundancy Switch

The CRS-170A L-Band 1:1 Redundancy Switch module, shown in **Figure 1-1**, is an L-Band Tx-Rx IF signal switch designed for use with L-Band satellite modems in a 1:1 configuration.

The Tx (transmit) side switches four modem output signals that are multiplexed onto the transmit coaxial cable:

- 950-2250 MHz L-band transmit RF;
- 10 MHz BUC frequency reference;
- 600 KHz BUC FSK control and status communication;
- BUC DC power supply.

The Rx (receive) side of the switch uses both power dividers and relays to provide the redundant modem interface for three signals multiplexed onto the LNB coaxial cable:

- 950-2250 MHz L-band receive RF from LNB;
- 10 MHz frequency reference to LNB;

- DC power supply to LNB.

The CRS-170A monitors the faults of both modems and determines which modem should be online. The data switch is built into each terrestrial data interface inside both modems (excluding CDM-600L [CLM-9600L] and SLM-300L3).

The CRS-170A is designed to support 1:1 redundancy for Comtech EF Data CDM-625/A, CDM-840, CDM-750, CDM-760, CDM-570L, CDM-700, CDM-710, CDM-710G, CDM-600L (CLM-9600L), and SDM-300L3 modems. **Table 1-1** summarizes the CRS-170A 1:1 IF Switch applications, including requirements for supporting data switching hardware and software.

Table 1-1. CRS-170A Application Summary

Modem	1:1 Data Switch (See Note 1)	Other Information (See Notes 2,3)
CDM-625/A	Built into the CDM-625/A	Firmware Ver. 1.1.1 or higher
CDM-840	Built into the CDM-840	Firmware Ver. 1.2.4 or higher
CDM-750	Built into the CDM-750	Firmware Ver. 1.1.1 or higher
CDM-760	Built into the CDM-760	Firmware Ver. 1.1.1 or higher
CDM-570L	Built into the CDM-570L	Firmware Ver. 1.6.7 or higher
CDM-570L IP Module	User-provided hub or Layer 2 switch	Firmware Ver. 1.5.4.2 or higher
CDM-700	Built into the CDM-700	Firmware Ver. 1.1.6 or higher; Chassis Rev. A or higher
CDM-710	Built into the CDM-710	Firmware Ver. 2.4.1 or higher; Chassis Rev. A or higher
CDM-710G	Built into the CDM-710G	Firmware Ver. 5.1.1 or higher
CDM-600L (CLM-9600L)	CRS-150	Firmware Ver. 1.1.4 or higher; Hardware Rev. 3 or higher
SDM-300L3	SMS-301	Special version of SMS-301

Notes:

1. For detailed information about the CRS-150 and SMS-301 switches, refer to their respective Installation and Operation Manuals.
2. Order modems with Type 'N' connectors.
3. Firmware updates are free and may be downloaded from the Comtech EF Data web page. If a modem does not meet the hardware requirements, contact CEFD – hardware revision upgrades must be performed at CEFD

The off-line modem holds its Rx terrestrial data in TRI-STATE® as commanded by the CRS-170A Switch. Because of this, it is very important to power down the off-line modem before disconnecting the modem from the Switch.

The CDM-600L (CLM-9600L) and SDM-300L3 modems do not have built-in switching capability for the terrestrial data side of the link. For the CDM-600L (CLM-9600L), 1:1 redundancy requires both a CRS-150 switch to act as controller and terrestrial data switch and a CRS-170A to perform the L-Band switching. The CRS-170A is required because the CRS-150 RF switching is limited to the

70/140 MHz band, and will not handle the high current BUC power supply multiplexed onto the transmit coaxial cable. Similarly, the SDM-300L3 requires an SMS-301 switch together with the CRS-170A.

In both cases, the CRS-170A is controlled by the supporting data switch, and places the “A” or “B” modem RF online to match the data switch state. The CDM-600L (CLM-9600L) modems supply redundant power to the CRS-170A through the CRS-150. The SMS-301 itself has redundant power supplies, and feeds power to the CRS-170A through the control cable. Online/standby modem configuration matching is provided by the CRS-150 controller communication with the CDM-600L (CLM-9600L) modem. The SMS-301 does not automatically configure the standby modem.

THE CRS-150 IS AN ACCESSORY PRODUCT DESIGNED SPECIFICALLY FOR THE COMTECH EF DATA CDM-600 AND CDM-600L (CLM-9600L) MODEMS, AND MUST NOT BE USED WITH ANY OTHER EQUIPMENT.

1.1.1 Modem Side Connectors

The modem side connectors, shown in **Figure 1-2** and outlined in the accompanying table, provide all necessary external connections between the CRS-170A L-Band 1:1 Redundancy Switch module and the specified Comtech EF Data modems.

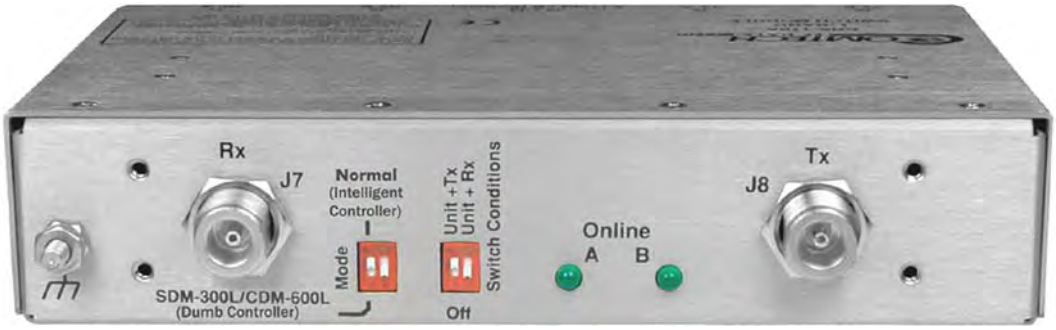
J6 | TX B **J5 | TX A** **J3 | Control A** **J2 | RX B** **J1 | RX A**
J4| Control B

Name	Ref Des	Connector Type	Function
RX A	J1	Type ‘N’	RF Input to Modem A
RX B	J2	Type ‘N’	RF Input to Modem B
Control A	J3	DB-9F (9-pin Type ‘D’ female)	Control Interface with Modem A
Control B	J4	DB-9F (9-pin Type ‘D’ female)	Control Interface with Modem B
TX A	J5	Type ‘N’	RF Output from Modem A
TX B	J6	Type ‘N’	RF Output from Modem B

Figure 1-2. CRS-170A – Modem Side Connectors

1.1.2 Antenna Side Connectors

Two 50Ω female Type 'N' connectors on the antenna side of the CRS-170A L-Band 1:1 Redundancy Switch module provide the coaxial cable connections to the outdoor transmit and receive equipment (BUC and LNB). Refer to **Figure 1-3** and its accompanying table for details (this image depicts the Rev. A and later versions of the CRS-170A).



Type 'N' Connector Name	Ref Des	Description	Direction
RX	J7	RF Input	In
		LNB 10 MHz Ref	Out
		LNB Power	Out
TX	J8	RF Output	Out
		BUC 10 MHz Ref	Out
		BUC FSK	In/Out
		Comm.	Out

Figure 1-3. CRS-170A – Antenna Side Connectors and Ground Lug

1.2 Functional Description

The CRS-170A L-Band 1:1 Redundancy Switch module performs the Tx and Rx coaxial switching required for redundant modem operation with an outdoor BUC and LNB. It switches all of the BUC and LNB interface signals that are multiplexed onto the Tx and Rx coaxial cables:

- Tx and Rx L-Band signals;
- 10 MHz reference to BUC and LNB;
- DC Power to BUC and LNB;
- FSK signaling to the BUC.

1.2.1 Operation with CDM-625/A, -840, -750, -760, -570L, -700, -710, -710G Modems

The CRS-170A is configured with two modems to form a complete 1:1 redundant modem system. Within the CRS-170A, a redundancy controller continually monitors the status of faults for both modems to determine which modem should be Online and Offline. The control cables between the modems and the CRS-170A include four signal groups:

- **First**, serial full-duplex communication lines are routed from one modem to the other modem via the CRS-170A. Using these lines, this Online modem can interrogate the Offline modem at regular intervals to determine its configuration. If a difference in configuration is detected, the Online modem will reconfigure the Offline modem so that the configurations are always synchronized. This process is *entirely automatic* – if the Offline modem is replaced, it does not have to be manually reprogrammed to match the Online modem.

- **Second**, the Unit, Tx and Rx faults signals from both modems are routed to the CRS-170A. This allows the redundancy controller to always know the health status of both modems.

- **Third**, the online/offline signals are routed from the CRS-170A to each modem. Based on the modem faults, the CRS-170A will determine which modem should be Online and Offline. In the event that both modems indicate faults through some malfunction, the CRS-170A switch will select, by default, **Modem A**.

- **Fourth,** +12V is routed from each modem to the CRS-170A for operational power. This power from both modems is diode OR'd so that the switch remains active if power is lost from one of the modems.

Mode Switches – The Mode DIP switches, located on the antenna side of the CRS-170A, allow the switch to operate in two different modes: **Normal** (**Intelligent Controller)** Mode and **SDM-300L/CDM-600L (Dumb Controller)** Mode.

- Use **Normal** (**Intelligent Controller)** Mode for CDM-625/A, CDM-840, CDM-750, CDM-760, CDM-570L, CDM-700, CDM-710 and CDM-710G modems.

- Use **SDM-300L/CDM-600L (Dumb Controller)** Mode for SDM-300L and CDM-600L (CLM-9600L) modems.

IF Switching – The CRS-170A provides L-Band redundancy, but when switching occurs, it accommodates more than just the L-Band signals:

- **On the Tx side,** it switches the Tx L-Band signal, the 10 MHz reference to the BUC, DC power to the BUC and, on CDM-570L modems, FSK signaling to the BUC.

- **On the Rx side,** it switches the 10 MHz reference to the LNB, and DC power to the LNB. The Rx L-Band signal from the LNB is split in a power divider to continuously drive both the Online and Offline demodulator. The Offline demodulator can then maintain lock so that it is ready to quickly assume Online status for receive traffic when a switchover is required.

Data Switching is accomplished inside each modem, in the data interface itself. A 'Y' cable connects both the Online modem and the Offline modem to the terrestrial data source. Transmit data drives both modems in parallel so that the standby modulator is always ready to come Online. Termination impedance for the modem line receivers is active in the Online modem. On the Rx side of the interface, TRI-STATE® control of the Offline modem line drivers keeps the Offline modem from interfering with the Rx data traffic. Send timing output from the Offline modem is also TRI-STATE®[1].

You must enable Manual Switching via the Online modem, through its front panel, or by remote control.

You must control Automatic Switching Selection via the Online modem. Then, from the CRS-170A, you must determine the conditions that cause an automatic switchover using two DIP switches – **Unit+Tx** and **Unit+Rx** – located on the antenna side of the CRS-170A and labeled **Switch Conditions**. This selection provides a great deal of flexibility in the operation of the switch: you can select between *Modem Unit faults only*; *Modem Unit faults or Receive Traffic faults*; *Modem Unit faults or Transmit Traffic faults*; or all three.

Also located on the antenna side of the CRS-170A are two green LEDs that indicate which modem is Online.

With the 'bridging' architecture of the CRS-170A (whereby identical terrestrial data traffic signals are routed to both Online and Offline modems), the redundancy controller can avoid unnecessary switchovers. By examining the fault status of both modems, it can infer if the fault is external to the system. For example, the CRS-170A has been configured to switch following Unit faults or Transmit Traffic faults, and the modems have been configured for external clock operation. Now, suppose that the external equipment (network, multiplex, router, etc.) fails – both the Offline and Online modems will now show a Transmit Traffic fault (No Clock Detected from Terrestrial Port). The CRS-170A Controller State Machine will see that both faults have occurred at the same time (in fact, within a 0.5 second window), and infers that the fault is external. Therefore, no unnecessary switchover is initiated.

[1] TRI-STATE is a registered trademark of National Semiconductor.

1.2.1.1 1:1 IP Redundancy Data Switching – Functional Description

1.2.1.1.1 CDM-570L (with Optional IP Module) – Managed Switch or Router Modes

- ***Do not use the M&C Ethernet port (bottom RJ-45 connector) when the optional IP Module is installed.***
- ***All configuration changes can only be made to the Online Modem and will require you to "`Save Parameters to permanent storage`" to ensure the configuration change is also applied to the Backup Modem.***

Managed Switch (Ethernet Bridge) Mode – For the CDM-570L in Managed Switch Mode (also known as "Ethernet Bridge Mode") you MUST use an external Ethernet hub to insure that traffic will continue after a switchover. If an Ethernet switch is used, there could be a several minute outage while the Ethernet Switch "re-learns" the correct output Ethernet port. Using a "dumb" Ethernet hub allows LAN-to-WAN traffic to continue even after a switchover occurs since both modems will be receiving the LAN traffic.

In Managed Switch Mode, both modems should be assigned a unique Management IP address on the same subnet in order to share the parameter file.

Router Mode – For the CDM-570L in Router Mode, you should use an external Ethernet switch. Router Mode does not require a "dumb" hub as with Managed Switch Mode, and for performance reasons an Ethernet switch is highly recommended.

In Router Mode, both modems must be assigned a unique Management IP address on the same subnet (172.18.10.21/24 and 172.18.10.22/24 as shown in **Figure 1-4** and **Figure 1-5**). This is used to share the param file. A Traffic IP address on the subnet must also be assigned (172.18.10.20/24) in the online modem.

Whichever modem is online will assume the Traffic IP. When there is a switchover to the backup modem, this modem will now assume the Traffic IP. As shown in **Figure 1-5**, the backup modem will also broadcast a "gratuitous ARP" that will tell all local devices to now associate a new MAC address for the Traffic IP 172.18.10.20. Each device will update their ARP tables and traffic will resume virtually instantaneously.

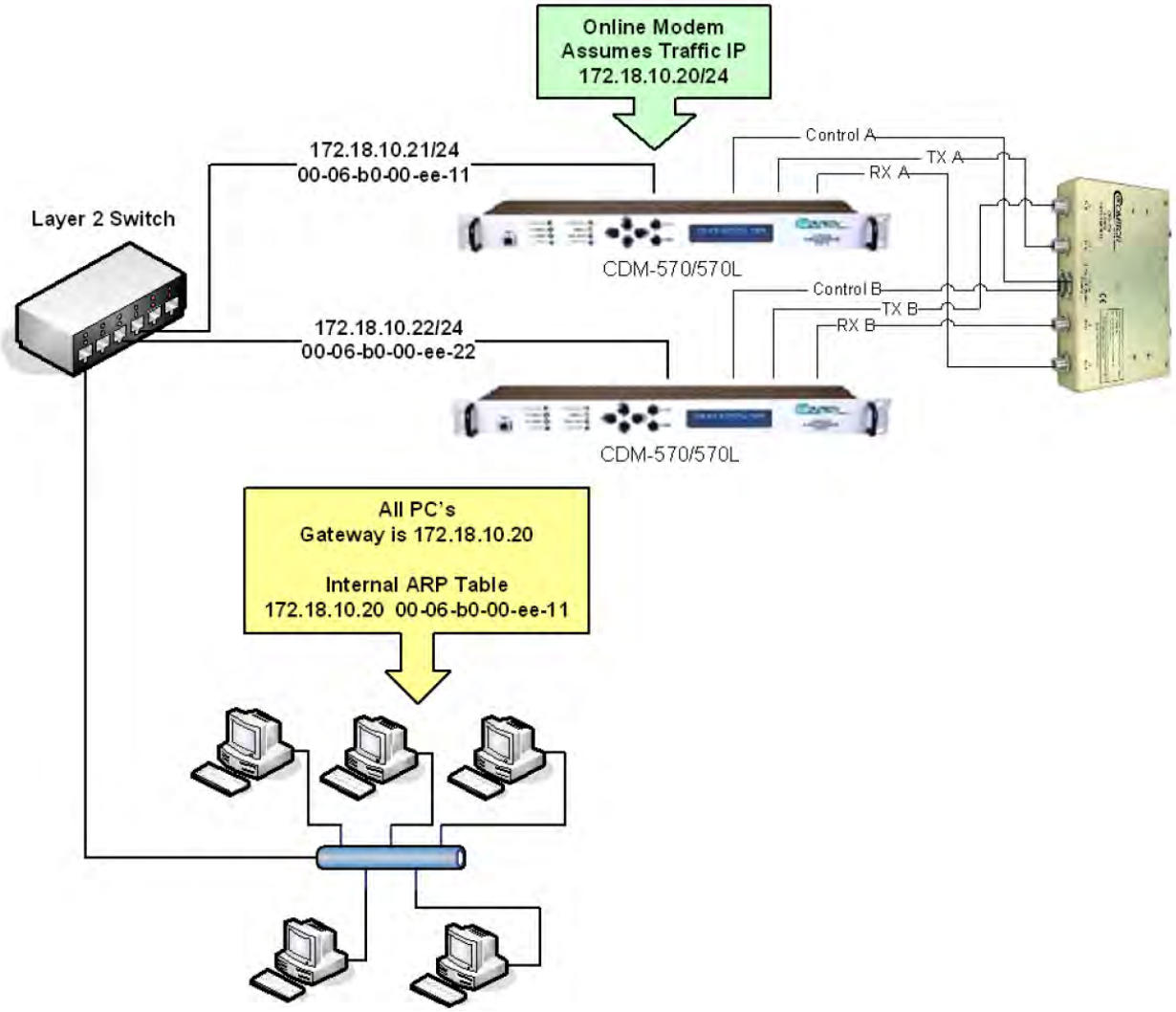


Figure 1-4. CDM-570L 1:1 IP Redundancy Router Mode – 'A' Online

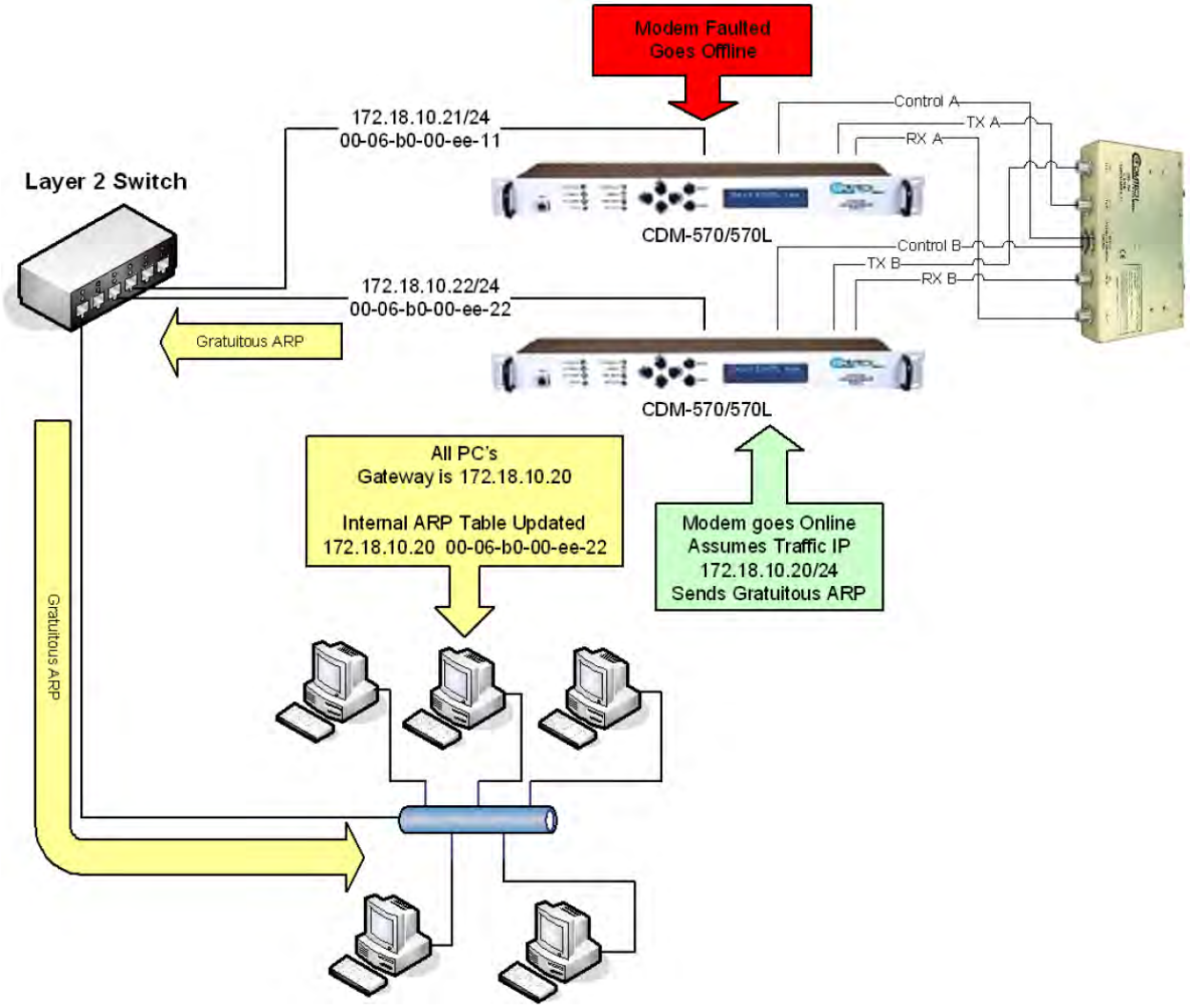


Figure 1-5. CDM-570L 1:1 IP Redundancy Router Mode – 'B' Online (Switchover)

1.2.1.1.2 CDM-625/A, -750, -760, -700, -710, -710G Managed Switch Mode

A standard, user-provided Ethernet Layer 2 Switch is needed when a CDM-625/A, CDM-750, CDM-760, CDM-700, CDM-710, or CDM-710G modem is configured for Managed Switch Mode (also known as "Ethernet Bridge Mode") terrestrial traffic.

A Layer 2 Switch is designed to limit the traffic that egresses each port by only sending Ethernet packets out the port that the destination network device is located. The switch maintains a table, known as the dynamic Content-Addressable Memory (CAM) table that maps MAC addresses to switch ports. When a packet arrives, in which an entry for that specific destination MAC is unknown to the switch, it sends the packet out all ports and waits for response packets in an attempt to identify which port that particular MAC resides. Once the device responds, the switch is able to map the MAC to the port in the CAM table.

Any new packets arriving destined for that MAC address will be forwarded only out the port identified in the CAM table. Most switch CAM tables do have a flush or timeout value, but is normally set to a very high number to limit the amount of times the switch has to broadcast a packet out all ports. It is also important to note that CAM entries for a specific port are cleared when a port link goes down.

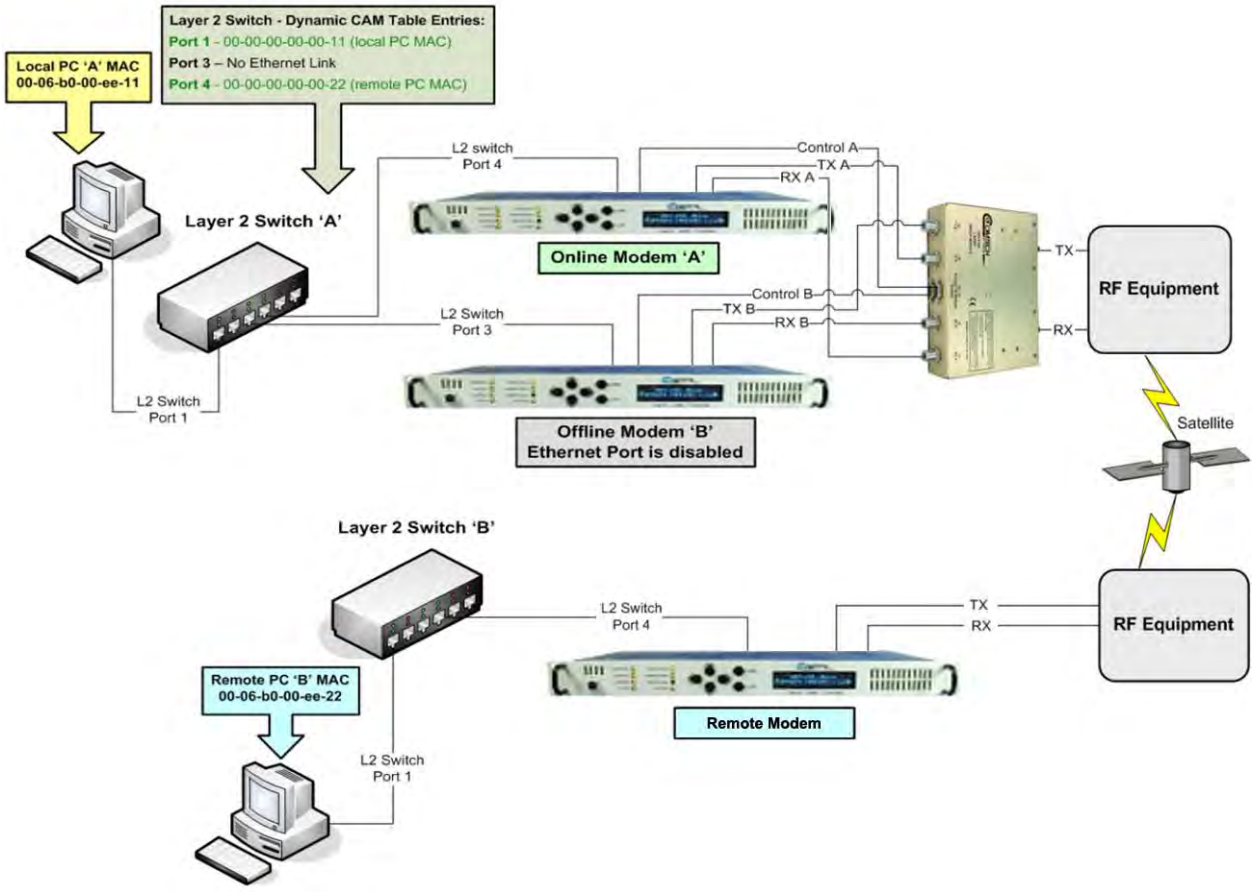


Figure 1-6. CDM-625/A, -750, -760, -700, -710, -710G 1:1 IP Redundancy Managed Switch Mode

Figure 1-6 shows a 1:1 IP Redundancy setup in Managed Switch Mode, with the Ethernet data interface of both CEFD modems connected to a Layer 2 Switch. Both modems are operational – Modem 'A' is Online and connected to Port 4 of the Layer 2 Switch. Modem 'B' is Offline and connected to Port 3 of the Layer 2 Switch, but the Ethernet link is not active because only the Online modem will have an active Ethernet data interface. Also, Local PC 'A' is connected to Port 1 of the Layer 2 Switch.

When Ethernet traffic is sent from Local PC 'A' across the satellite link to remote PC 'B', the Layer 2 Switch will "learn" the MAC addresses of both PCs and will have these dynamic entries in its CAM Table:

Port 1 MAC 00-00-00-00-00-11 (Local PC 'A')
Port 3 No entries, port down
Port 4 MAC 00-00-00-00-00-22 (Remote PC 'B')

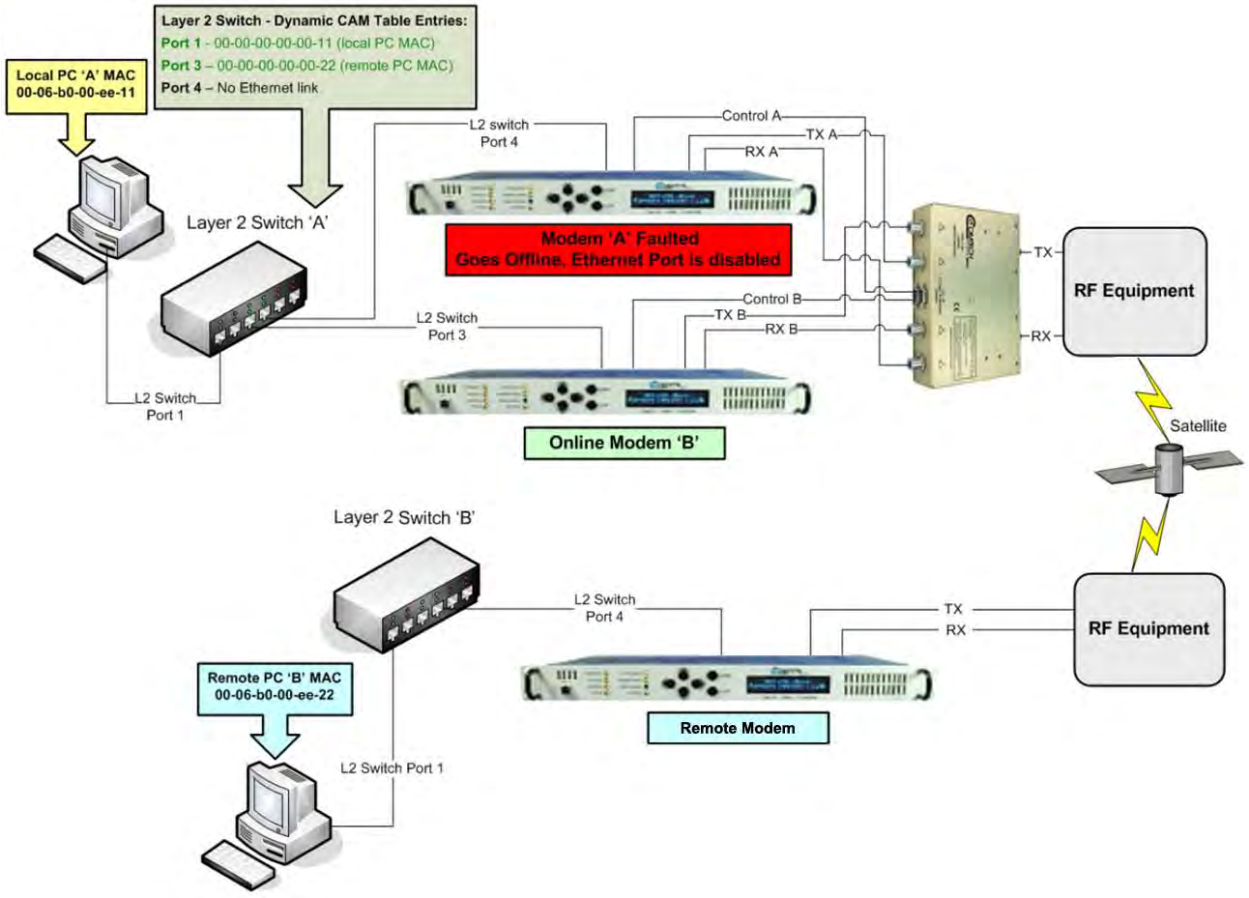


Figure 1-7. CDM-625/A, -750, -760, -700, -710, -710G 1:1 IP Redundancy Managed Switch Mode – Switchover

As shown in **Figure 1-7**, in the event of a fault occurring on the Online Modem 'A', the following will occur:

- Modem 'A' goes Offline and disables its Ethernet data interface.
- Simultaneously, Modem 'B' goes Online and enables its Ethernet data interface.
- Layer 2 Switch 'A' senses that Port 4 is no longer active and clears the CAM table entries for that port.
- When the next Ethernet packet from Local PC 'A' destined for Remote PC 'B' arrives at Switch 'A', there is no CAM entry for the PC 'B' MAC, so it will be broadcast to all active ports.
- When the next Ethernet packet from Remote PC 'B' arrives at Switch 'A', Switch 'A' dynamically adds the PC 'B' MAC to the CAM table for Port 3.

Note the following:

1. The Managed Switch Mode method of redundancy is intended to be equivalent to pulling the Ethernet cable from one port and putting it into a different port on the same switch.

2. **For the CDM-625/A modem:** You may configure one of the CDM-625/A's four available 10/100 Ethernet ports for M&C Ethernet. As configured in **Dedicated Management Port Mode**, when the modem is offline the *M&C-designated port* remains functional and available for operation, while the three remaining ports are unavailable. Otherwise, if *none* of the 10/100 Ethernet ports are reserved for M&C operation, *all four ports* become unavailable when the modem is offline.

   This configuration must be enabled on both modems.

   Refer to the ***CDM-625 or CDM-625A Advanced Satellite Modem Installation and Operation Manuals*** for instructions to configure one of the four 10/100 Ethernet ports for each modem for remote Ethernet M&C.

   Dedicated Management Port Mode is not configurable for use when the optional IP Packet Processor is installed and enabled. With the IP Packet Processor enabled, as a means to avoid Ethernet Networking Loops, only one of the CDM-625/A's four 10/100 Ethernet Ports is used for each modem at any given time.

3. **For the CDM-750, -760, -700, -710, and -710G modems:** When the modem is offline, although all GigE port(s) are unavailable, the M&C Ethernet port remains functional and available for operation.

4. Installation must use a true switching device, not a hub device.

1.2.1.1.3 CDM-625/A (with Optional IP Packet Processor) – Router Mode

All configuration changes can only be made to the Online Modem and will require you to "Save Parameters to permanent storage" to ensure the configuration change is also applied to the Backup Modem.

For the CDM-625/A with the optional IP Packet Processor ***installed*** and ***enabled*** and the configuration set for Router Mode, you must provide an external Ethernet switch.

In Router Mode, both modems must be assigned a unique Management IP address on the same subnet (172.18.10.21/24 and 172.18.10.22/24 as shown in **Figure 1-8** and **Figure 1-9**). This is used to share the param file. A Traffic IP address on the subnet must also be assigned (172.18.10.20/24) in the online modem.

The Traffic IP Address must be different from either Management IP Address.

Whichever modem is online will assume the Traffic IP. When there is a switchover to the backup modem, this modem will now assume the Traffic IP.

Per **Figure 1-9**, the backup modem will also broadcast a "gratuitous ARP" which will tell all local devices to now associate a new MAC address for the Traffic IP 172.18.10.20. Each device will update their ARP tables and traffic will resume virtually instantaneously.

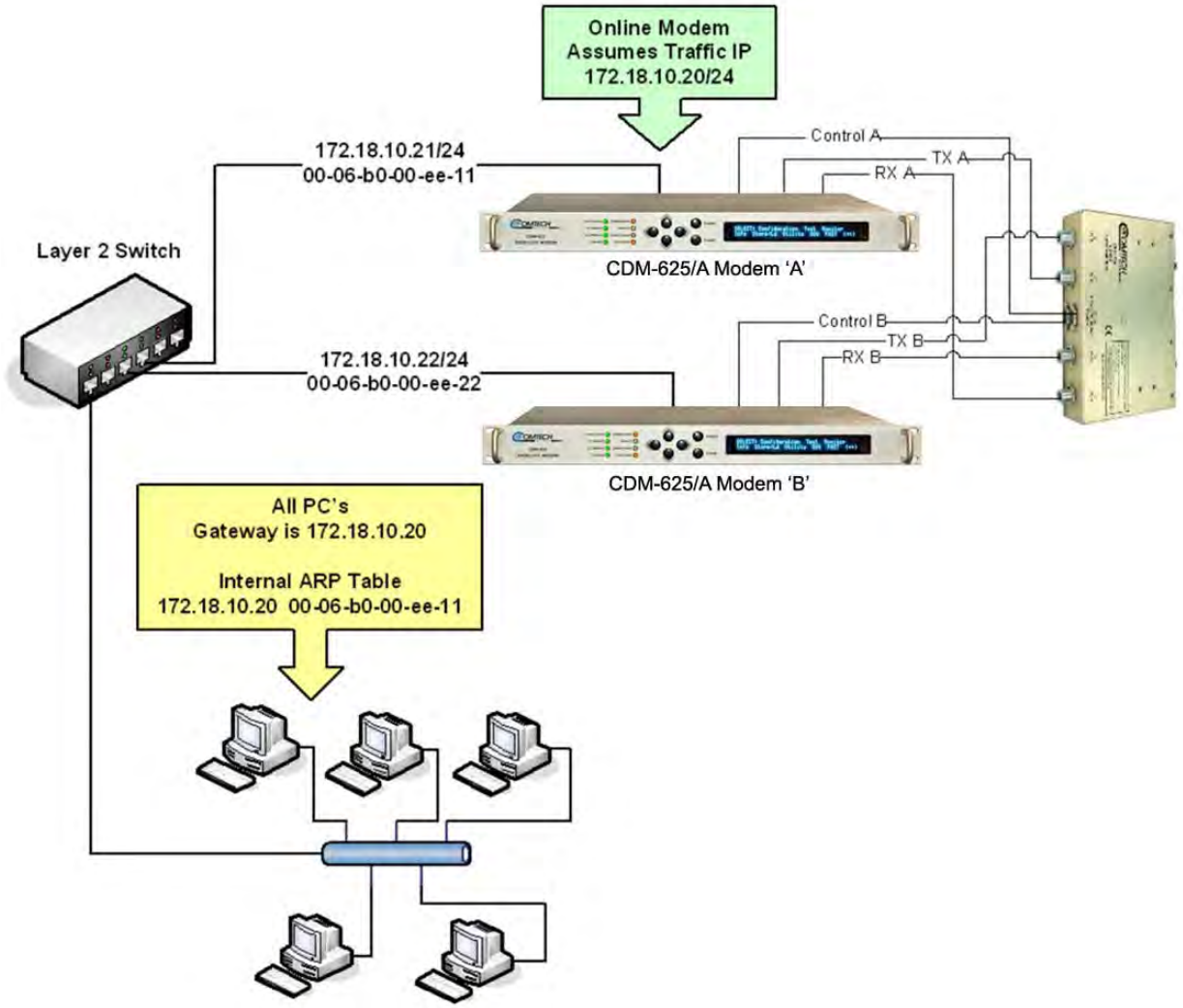


Figure 1-8. CDM-625/A 1:1 IP Redundancy Router Mode – 'A' Online

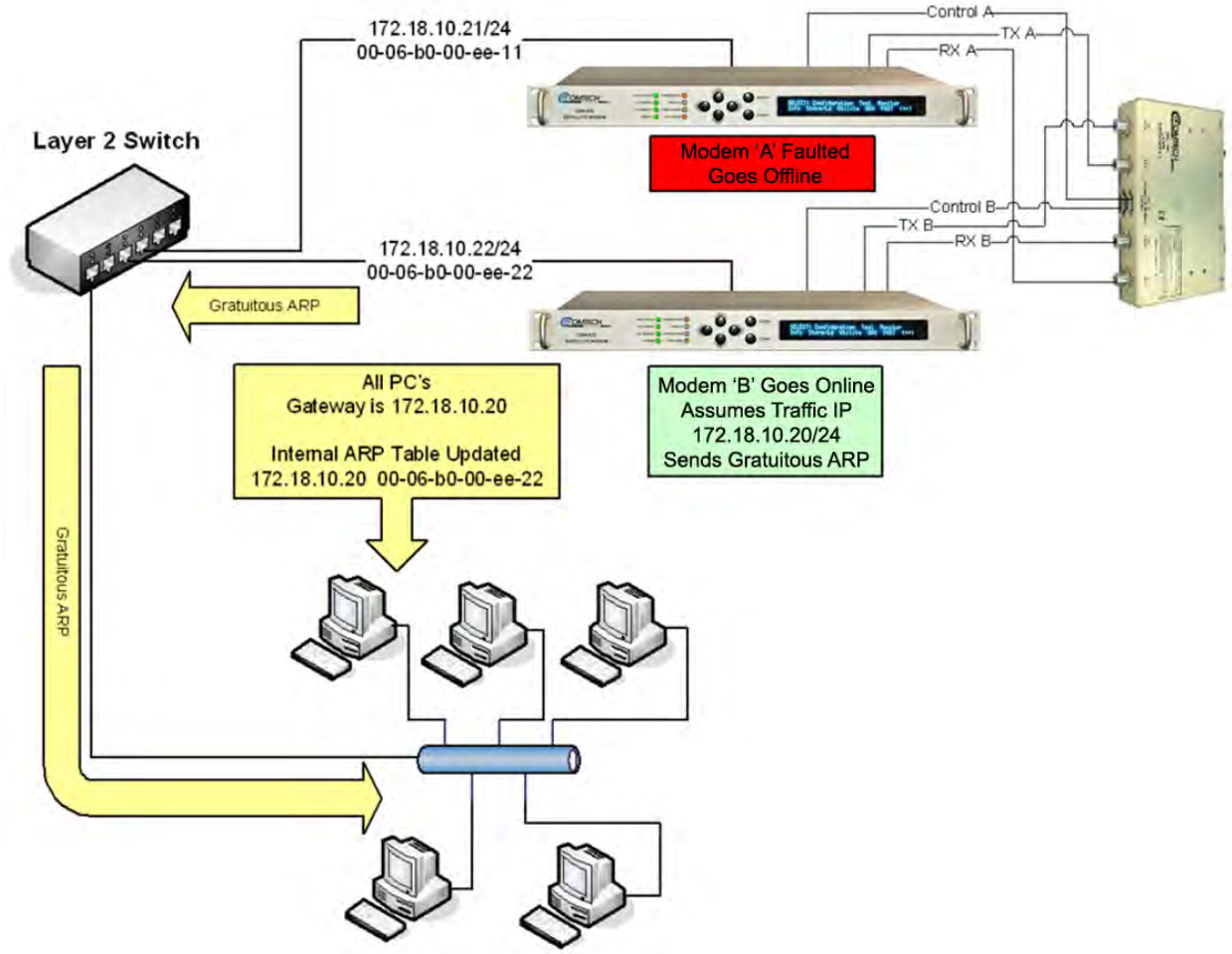


Figure 1-9. CDM-625/A 1:1 IP Redundancy Router Mode – 'B' Online (Switchover)

1.2.2 Operation with CDM-600L (CLM-9600L) and SDM-300L3

Operation with two CDM-600L (CLM-9600L) modems requires an additional CRS-150 1:1 switch for terrestrial data switching and 1:1 control, while operation with two SDM-300L3 modems requires an additional SMS-301 1:1 switch to handle terrestrial data and control. Thus, there are three functional configurations for the CRS-170A.

1.2.3 Operation with CDM-600L (CLM-9600L) and CRS-150

The CRS-150 connects to two modems (an online unit and a standby unit), monitors the fault status of these two units, and controls the routing of data to and from the two units. IF signals, 10MHz reference signals, DC power for the BUC and LNB, and FSK signaling to the BUC are switched in the CRS-170A under control of the CRS-150. In the case of an equipment failure, automatic switching takes place to protect the traffic circuit.

At the heart of the CRS-150 is a Controller State Machine that is responsible for fault monitoring and control of switching functions – it is implemented in a CPLD.

The CRS-150 redundancy switch derives its operating power from the two modems (online and standby units) via extra power-carrying wires in the data cable from each modem. Similarly, the CRS-170A derives its +12V power from both modems through 'Y' cable connection to the same cables. The required online and offline control signals are also included in these cables. A diode sharing arrangement with a current sharing circuit ensures that power is taken equally from the two modems in normal operation.

In the event that one of the two units is removed, however, the remaining modem can supply all current requirements. The modems supply +12 volts DC (at a combined total of 400 mA max) and -12 volts DC (at a combined total of 120 mA max). Maximum power consumption occurs in a serial LVDS mode at maximum data rate (20 Mbps). Power consumption in EIA-232 modes is approximately 40% of the maximum values. The modem employs electronic fuses that prevent excessive current from being drawn by the CRS-150 should an anomalous condition occur.

Transmit Clock and Data signals entering the CRS-150 via the Data Interface are buffered and fed to both modems simultaneously; this parallel feed ensures that the standby unit sees the same traffic conditions as the online unit. Rx Data and Clock signals coming from the online modem are routed through signal relays to the Data Interface. In the event that a switchover occurs, these relays switch so the standby unit then supplies the Data and Clock signals.

As only one modem in the pair (the online unit) is permitted to transmit its IF carrier signal at any one instant, the standby unit is forced to disable its Tx carrier by asserting the Tx Carrier Off signal at the Data Interface. Additionally, the CRS-170A provides further isolation and security by using an RF relay within the CRS-170A.

The Rx IF signal is fed to both modems simultaneously through the power divider in the CRS-170A. This divider introduces a loss of approximately 3.5 dB but, given the wide dynamic range of the demodulator in the CDM-600L (CLM-9600L), this is not considered to be a problem. The advantage of this scheme is that the demodulators in both online and standby units are locked, and therefore if a switchover does occur, there will be no delay while waiting for the demodulator to acquire lock.

Fault status information is fed from each of the two modems via the Data Interface connector. Based on the fault status, the Controller State Machine in the CRS-150 decides whether the ‘A’ or ‘B’ unit is to be the online unit. It asserts a control signal to the standby unit, which mutes its Tx IF carrier and simultaneously indicates to the microcontroller within the standby unit that the unit is no longer ‘online’. Consequently, the ‘online’ LED on the front panel of the standby modem is extinguished and the standby status is also reported over the remote control bus so an external M&C system can determine the state of the redundancy system. At the same time, a green LED will illuminate on the front of the CRS-150 to indicate whether the ‘A’ or ‘B’ unit is online, and a green LED on the antenna side of the CRS-170A will indicate the same status.

DIP switches on the CRS-170A’s front panel are set to establish modem-specific operation. With the CDM-600L (CLM-9600L), place the Mode switch in the SDM-300L/CDM-600L (CLM-9600L) position and push the Switch Condition switches to the OFF position. See **Section 3.7 Switch DIP Settings** for detailed information.

1.2.4 Operation with SDM-300L3 and SMS-301

The SMS-301 is modified from the standard version that operates with 70/140 MHz IF SDM-300A modems. The BNC IF connectors are removed since the connectors and internal switching are not suitable for L-Band operation. Signals on the Status/Faults connector (J14) are modified to provide +12VDC power output and A/B switch control outputs to the CRS-170A. The SMS-301 has its own redundant power supplies, so the CRS-170A receives redundant power.

Operation here is similar to operation with two CDM-600L (CLM-9600L) modems and a CRS-150 switch. The SMS-301 operates as the principal switch and controller, with the CRS-170A providing the required switching for L-Band signals, references, and power supplies that the SMS-301 cannot handle. The SMS-301 connects to two modems (an online unit and a standby unit), monitors the fault status of these two units, and controls the routing of data to and from the two units. IF signals, 10MHz reference signals, DC power for the BUC and LNB, and FSK signaling to the BUC are switched in the CRS-170A under control of the SMS-301. In the case of an equipment failure, automatic switching takes place to protect the traffic circuit. Consult the *Comtech EF Data SMS-301 Redundancy Switch Installation and Operation Manual* for detailed information on operation of the SMS-301. All operation as a 70/140 MHz modem switch applies except that the RF switching is done in the CRS-170A.

DIP switches on the CRS-170A's front panel are set to establish modem-specific operation. With the SDM-300L, place the Mode switch in the SDM-300L/CDM-600L (CLM-9600L) position and push the Switch Condition switches to the OFF position. See **Section 3.7 Switch DIP Settings** for detailed information.

1.3 Summary of Specifications

Equipment Type	L-Band 1:1 Redundancy Switch
Manufacturer	Comtech EF Data, Tempe, Arizona
Supported Comtech EF Data Modems	• CDM-625/A with/without optional IP Packet Processor • CDM-840 Remote Router • CDM-750 • CDM-760 • CDM-570L • CDM-570L with optional IP Module • CDM-700 • CDM-710 • CDM-710G • CDM-600L (CLM-9600L) with CRS-150 1:1 Data Switch • SDM-300L3 with SMS-301 1:1 Data Switch
Operating Modes	• Fully Automatic under control of supporting 1:1 switch. • Manual under control of supporting 1:1 switch.
Architecture	• Full bridging architecture when supported by CRS-150, or SMS-301 data switching and control, with configuration synchronization. • Tx redundancy supports all IBUC interface signals (RF, 10 MHz reference, FSK communications, and power supply) • Rx IF signal fed to both Online and Standby units. Rx switching supports all LNB interface signals (RF, 10 MHz reference, and power supply.)
Switch Conditions	Tx/Rx switching follows state of supporting data switching via control input from data switch.
IF Switching / Splitting	• Tx IF: Switched by RF relay (1.5 dB max loss, 40 dB min ON/OFF isolation) • Rx IF: Passive power splitting (7 dB max loss)
BUC Power Switching	Switched by power relay (60VDC max, 4A max)
BUC 10 MHz Reference Switching	Switched by relay (1 dB max loss, 70dB min ON/OFF isolation)
BUC FSK Comm Switching	Switched by relay (70dB min ON/OFF isolation)
LNB Power Switching	Switched by power relay (28 VDC max)
LNB 10 MHz Reference Switching	Switched by relay (1 dB max loss)
Tx-Rx Isolation	90dB min, 950-2250 MHz
IF Impedance	Optimized for 50Ω (> 10 dB return loss on external IF ports)
IF Connectors	50Ω Type N Female
IF Frequency Range	950-2250 MHz

Weight	1.1lbs (0.5kg)
Dimensions [excluding connectors]	1.7 H x 5.7 W x 4.1 D inches (43 H x 143 W x 104 D mm) 19-inch rack mounting kit available.
Power requirements	• + 12 volts DC @ 130 mA (max) • Power supplied by modems or from the CRS-150 Data Switch (*when used in tandem with the CDM-600L [CLM-9600L] modem*), or from the SMS-301 Data Switch (*when used in tandem with the SDM-300L modem*).
Approvals	'CE' as follows: • EMC • Safety

Chapter 2. INSTALLATION

2.1 Unpacking and Inspection

The CRS-170A L-Band 1:1 Redundancy Switch module and its Installation and Operation Manual were packaged and shipped in a reusable cardboard carton containing protective foam spacing.

This equipment contains parts and assemblies sensitive to damage by Electrostatic Discharge (ESD). Use ESD precautionary procedures when handling the equipment.

Once opened, inspect the shipment:

Step	Task
1	Keep all shipping materials for storage or reshipment.
2	Check the packing list to ensure the shipment is complete.
3	Inspect the equipment for any possible damage incurred during shipment. Contact the carrier and Comtech EF Data immediately to submit a damage report if damage is evident.
4	***Review this manual and the pertinent modem's*** **Installation and Operation Manual** ***carefully to become familiar with 1:1 redundancy operation.***
5	***Proceed to*** **Sect. 2.2 Mounting.**

2.2 Mounting

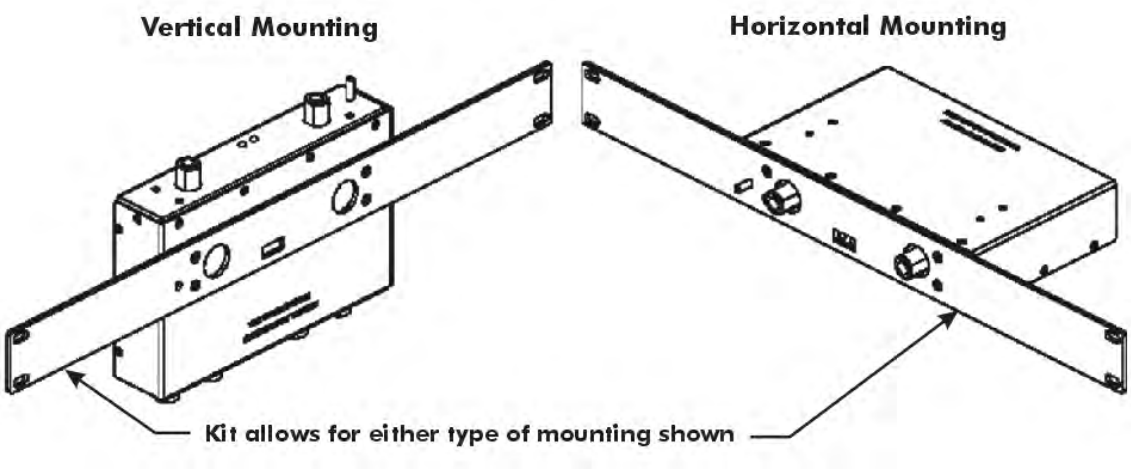


Figure 2-1. KT/10254 Mounting Panel Kit (for horizontal or vertical mounting)

The CRS-170A is designed to be freestanding, or mounted in the rear of the rack containing the modems using the available Comtech EF Data Mounting Panel Kit KT/10254.

As shown in **Figure 2-1**, this kit allows the module to be mounted horizontally or vertically in the rack. In applications with the CDM-600L (CLM-9600L) and the CRS-150, the CRS-170A is best mounted horizontally above or below the CRS-150.

Otherwise, because of the module's small size and weight, you may choose to let the module hang freely, supported by the interfacing cables.

Chapter 3. MODEM AND SWITCH CONFIGURATION

3.1 Overview

In order to avoid damage to the modems and CRS-170A switch, it is important to follow this sequence of configuration:

- First, ***configure the modems for 1:1 redundant operation as outlined in this chapter in*** **Sect. 3.2** ***through*** **Sect. 3.7.**
- Second, ***once the modems have been properly configured for 1:1 redundant operations, set the DIP switches on the CRS-170A to the correct modem selection, as outlined in this chapter in*** **Sect. 3.8 CRS-170A Switch DIP Settings.**
- Third, ***once the modem and switches have been properly configured, connect the cables between the*** **powered OFF** ***modems and switch as outlined in*** **Chapter 4. CABLES AND CONNECTIONS.**

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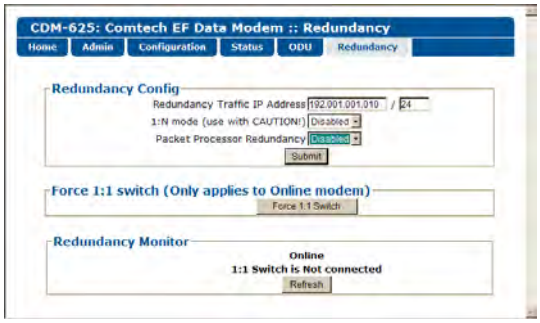
3.2 Configuring CDM-625/As for 1:1 Redundancy

- ***CDM-625A Advanced Satellite Modem Installation and Operation Manual (CEFD P/N MN-CDM625A)***
- ***CDM-625 Advanced Satellite Modem Installation and Operation Manual (CEFD P/N MN-CDM625)***

The CDM-625/A Advanced Satellite Modem automatically detects if it is connected to a 1:1 redundancy system – the steps required to configure both modems are therefore minimal, with some exceptions:

- If the CDM-625/A has the optional IP Packet Processor ***installed*** and ***enabled***, 1:1 Redundancy is controlled from the CDM-625/A Web Server Interface **Redundancy** page.



  When both the traffic and backup modems are equipped with the optional IP Packet Processor and are connected to the CRS-180 L-Band 1:1 Redundancy Switch), there is no need to use the drop-down menu here, as Packet Processor Redundancy is enabled *automatically**.***

  If it is desired to operate either modem outside of the redundant setup as a standalone unit, use the drop-down menu to select Packet Processor Redundancy for that specific modem as **Disabled**.

- If terrestrial data is *not* Ethernet and CnC will *not* be used, then no modem 1:1 redundancy configuration is needed. Otherwise, if either apply, refer to the sections that follow.

3.2.1 User Remote Ethernet M&C Interface

You may configure one of the CDM-625/A's four available 10/100 Ethernet ports for M&C Ethernet. As configured in **Dedicated Management Port Mode**, when the modem is offline the *M&C-designated port* remains functional and available for operation, while the three remaining ports are unavailable. Otherwise, if *none* of the 10/100 Ethernet ports are reserved for M&C operation, *all four ports* become unavailable when the modem is offline.

This configuration must be enabled on both modems.

Refer to the ***CDM-625 Advanced Satellite Modem Installation and Operation Manual*** for instructions to configure one of the four 10/100 Ethernet ports for each modem for remote Ethernet M&C.

Dedicated Management Port Mode is not configurable for use when the optional IP Packet Processor is installed and enabled. With the IP Packet Processor enabled, as a means to avoid Ethernet Networking Loops, only one of the CDM-625's four 10/100 Ethernet Ports is used for each modem at any given time.

3.2.2 Carrier-in-Carrier® Redundancy Configuration

If Carrier-in-Carrier® (CnC) is utilized, the CnC control setting must be set to **Redundancy** mode using the CDM-625/A front panel menus.

Configuration of the CnC control setting for CDM-625/A 1:1 Redundancy is as follows:

Step	Procedure

1	From the top-level SELECT: menu, navigate each menu level using the◀▶ arrow keys and the ENTER key until the PMSI control mode screen appears as follows:
	
	SELECT: Configuration → CnC → PMSI-control
	
	`CnC PMSI mode: Redundancy`
	`(Idle, Redundancy, Talk, Listen) (⬍)`
	
	From the CnC PMSI mode screen, use the▲ ▼ arrow keys to select Redundancy, and then press ENTER.

2	The two modems will now need to be connected together via use of a 1:1 PMSI cable (note that this cable bypasses the CRS-170A). **Chapter 4. CABLES AND CONNECTIONS** The Pre-Mapped Symbol Interface (PMSI) is a function associated with DoubleTalk® Carrier-in-Carrier® that permits the modulator in a selected unit to provide a direct copy of its output (the outbound interferer) to the second modem. The other modem may then choose to take the PMSI signal and use it for its own CnC reference. In this 1:1 redundancy, the PMSI is an EIA-485 multi-drop bus system where one device transmits and the other device on the multi-drop bus is configured to receive.

3.3 CDM-840 Operation in 1:1 Redundancy

CDM-840 Remote Router Installation and Operation Manual (CEFD P/N MN-CDM840)

The CDM-840 Remote Router automatically detects if it is connected to a 1:1 redundancy system. With both units automatically configured for 1:1 operation, the online unit keeps the offline unit updated as online unit configuration changes occur.

You can also manually force backup of the online unit. Using the **Redundancy** section of the CDM-840 Web Server (HTTP) Interface '**Utility | Utility**' page (**Figure 3-1**), if the unit is part of a 1:1 redundant pair and this unit is currently *online*, click **[Force Redundancy Switch]** to force the current unit to switch to standby mode.

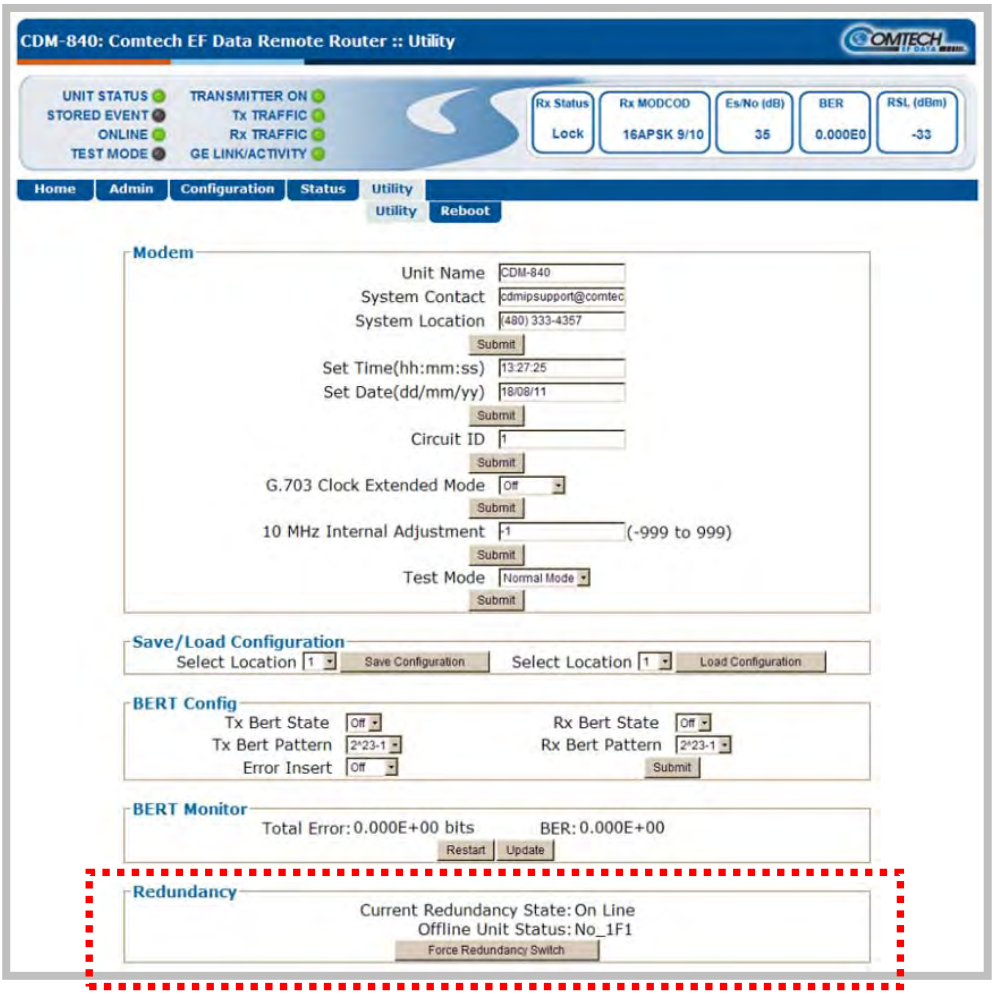


Figure 3-1. CDM-840 Web Server (HTTP) Interface 'Utility' Page

Notes:

3.4 CDM-750 or CDM-760 Operation in 1:1 Redundancy

- ***CDM-750 Advanced High-Speed Trunking Modem Installation and Operation Manual (CEFD P/N MN-CDM750)***
- ***CDM-760 Advanced High-Speed Trunking Modem Installation and Operation Manual (CEFD P/N MN-CDM760)***

The CDM-750 and CDM-760 Advanced High-Speed Trunking Modems automatically detect if they are connected to a 1:1 redundancy system.

Typical for either product, with both modems automatically configured for 1:1 operation, the online modem keeps the offline modem updated as online modem configuration changes occur.

You can also manually 'force' backup of the online modem. Use the modem front panel to select the **`Utility ▶ 1:1`** screen:

```
Press ENTER key to force Unit into
Standby (1:1 only)
```

If the unit is part of a 1:1 redundant pair and this unit is currently *online*, press **ENTER** to force the current unit to switch to standby mode.

Notes:

3.5 Configuring CDM-570Ls for 1:1 Redundancy

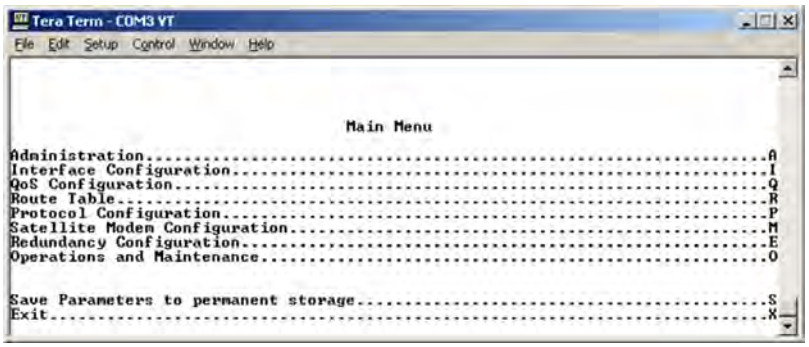
CDM-570/CDM-570L/CDMR-570L Satellite Modem Installation and Operation Manual (CEFD P/N MN/CDM570L.IOM)

For correct operation of the CRS-170A, the CDM-570L Satellite Modems must have the following installed:

- ***Base Modem Firmware Version 1.6.7 (or higher)***
- ***IP Module Firmware Version 1.5.4.2 (or higher)***

If the modems do not meet this requirement, contact Comtech EF Data. Firmware updates are free and may be downloaded from the CEFD web page. Hardware revision upgrades must be performed at CEFD.

CDM-570L Front Panel



Serial Console Command Line Interface (CLI)

Figure 3-2. CDM-570L Configuration Interfaces

Because the modem automatically detects if it is connected to a 1:1 redundancy system, the steps required to configure both modems are minimal. Use each modem's front panel to fully configure, monitor, and control the modem operation. The front panel keypad and display are used to display all available options. Nested menus display all prompts needed to carry out a required action. Refer to the pertinent modem's user manual for detailed configuration information.

Alternately, configuration, monitoring and control of redundant systems is possible via remote means over an EIA-485 multi-drop bus using the Serial console **C**ommand **L**ine **I**nterface, where data is transmitted in asynchronous serial form using ASCII characters (see **Figure 3-2**). Refer back to the modem manual for detailed information on either methodology.

3.5.1 IP Redundancy Configuration

Setup of a CDM-570L 1:1 IP Redundancy System, using the CLI, is as follows:

Step	Procedure
1	The two modems will need an Ethernet connection to each other through a Layer 2 switch (preferred) or hub.
2	Before connecting the modems to the CRS-170A, you will need to first configure the following modem IP module settings: • Redundancy Configuration → 1:1 Redundancy set to DISABLED. • Administration → Working Mode: Both modems need to be set to the same Working Mode. • Administration → Features: Both modems need to have the same IP Option Feature set.
3	On both modems, enter a unique IP Address that is on the same subnet (Interface Configuration → Ethernet Interface → IP Address). Verify that you can ping from one modem to the other (Operations and Maintenance → Diagnostics → Ping).
4	On both modems, set Redundancy Configuration → 1:1 Redundancy to ENABLED. Save Parameters to permanent storage and power down both modems.
5	Connect the modems to the CRS-170A. **CDM-570/CDM-570L/CDMR-570L Satellite Modem Installation and Operation Manual (CEFD P/N MN/CDM570L.IOM): Section H.5 Cabling with the CDM-570L and Section H.6 Cabling with the CDM-570 IF.**
6	While monitoring the Serial console CLI on both modems, observe the following after powering on both modems at the same time (also observe the CRS-170A Online LEDs to see which modem is the Online modem). Online modem CLI displays: 1:1 Redundancy (Auto Detected) Redundancy: PARAM File Connection Established. Redundancy: Sending PARAM File... Offline modem CLI displays: 1:1 Redundancy (Auto Detected) Redundancy: Received PARAM File... Writing 5447 bytes to PARAM file on Flash
7	On the Online modem, select the Redundancy Configuration menu (Figure 3-3). Observe that the correct IP Address/Mask is displayed for the Local and Redundant Unit. You will then need to set the Traffic IP Address/Mask (this also needs to be in the same subnet as the Management IP addresses).

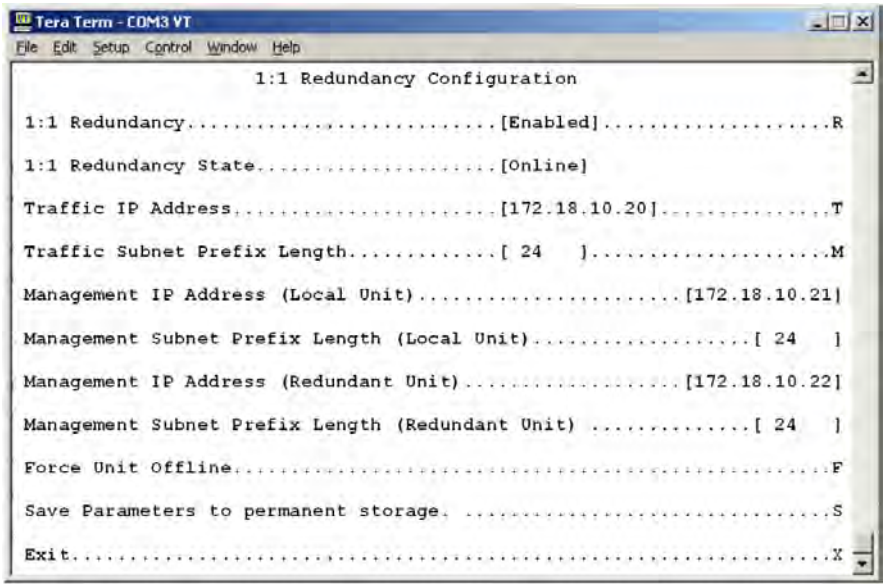

Tera Term - COM3 VT
File Edit Setup Control Window Help
1:1 Redundancy Configuration
1:1 Redundancy.....[Enabled].....R
1:1 Redundancy State.....[Online]
Traffic IP Address.....[172.18.10.20].....T
Traffic Subnet Prefix Length.....[24].....M
Management IP Address (Local Unit).....[172.18.10.21]
Management Subnet Prefix Length (Local Unit).....[24]
Management IP Address (Redundant Unit).....[172.18.10.22]
Management Subnet Prefix Length (Redundant Unit) .....[24]
Force Unit Offline.....F
Save Parameters to permanent storage. .....S
Exit.....X

Figure 3-3. CDM-570L CLI 1:1 Redundancy Configuration screen

All configuration changes can only be made to the Online Modem and will require you to "Save Parameters to permanent storage" to ensure the configuration change is also applied to the Backup Modem.

3.5.2 Non-IP Redundancy Configuration

Setup of the CDM-570L modems for 1:1 Redundancy, when the terrestrial data type is **non-Ethernet** (i.e. RS422, G.703), is as follows:

Step	Procedure
1	On both modems, Enable 1:1 Redundancy: Redundancy Configuration → 1:1 Redundancy set to ENABLE.
2	Connect all cables – including the control cable, IF cable and data 'Y'cables – to the modems and the CRS-170A. Chapter 4. CABLES AND CONNECTIONS

Notes:

3.6 Configuring CDM-700s/CDM-710s/CDM-710Gs for 1:1 Redundancy

- ***CDM-700 Satellite Modem Installation and Operation Manual (CEFD P/N MN/CDM700.IOM)***
- ***CDM-710 Broadcast Satellite Modem Installation and Operation Manual (CEFD P/N CDM710.IOM)***
- ***CDM-710G Satellite Modem Installation and Operation Manual (CEFD P/N MN-CDM710G)***

For correct operation of the CRS-170A, the CDM-700, CDM-710, or CDM-710G modems must have the following installed:

- ***For the CDM-700:***
  - ► ***Firmware Version 1.1.6 (or higher)***
  - ► ***Hardware Revision A (chassis with round-buttoned keypad)***
- ***For the CDM-710:***
  - ► ***Firmware Version 2.4.1 (or higher)***
  - ► ***Hardware Revision A (chassis with round-buttoned keypad)***
- ***For the CDM-710G:***
  - ► ***Firmware Version 5.1.1 (or higher)***

If the modems do not meet this requirement, contact Comtech EF Data. Firmware updates are free and may be downloaded from the CEFD web page. Hardware revision upgrades must be performed at CEFD.

Note that Hardware upgrades are possible only for the Rev. A chassis and later versions of the CDM-700/710 – 1:1 redundancy operation is not available with hardware prior to Rev. A.

Use each modem's front panel to fully configure, monitor, and control the modem operation. The front panel keypad and display are used to display all available options. Nested menus display all prompts needed to carry out a required action. Refer to the pertinent modem's user manual for detailed configuration information.

3.6.1 IP Redundancy Configuration

Setup of the CDM-700/CDM-710/CDM-710G modems for 1:1 IP Redundancy (i.e., when the terrestrial data type is GigE) is as follows:

Step	Procedure
1	Before connecting the modems to the CRS-170A, you will need to first configure the following IP module settings on the modems. From the modem front panel: CONFIG → AUX (Redundancy Mode) → ENA/DIS set to Disable.
2	On both modems, set the redundancy to the Enable state: CONFIG → AUX (Redundancy Mode) → ENA/DIS set to Enable. Press ENTER to save parameters to flash memory
3	Connect all cables – including the control cable, IF cable and data cables – to the modems and the CRS-170A. Additionally, both modems will need an Ethernet connection to each other through a Layer 2 switch. Chapter 4. CABLES AND CONNECTIONS
4	Verify that one modem is ONLINE by the front panel LEDs; also verify that the ONLINE LEDs for the CRS-170A indicate the same online state as the modems.

All configuration changes can only be made to the Online Modem and will require you to "Save Parameters to permanent storage" to ensure the configuration change is also applied to the Backup Modem.

3.6.2 Non-IP Redundancy Configuration

Setup of the CDM-700/CDM-710/CDM-710G modems for 1:1 Redundancy when the terrestrial data type is **non-Ethernet** (i.e. HSSI, G.703) is as follows:

Step	Procedure
1	On both modems, set the redundancy to the Enable state: CONFIG → AUX (Redundancy Mode) → ENA/DIS set to Enable.
2	Connect all cables – including the control cable, IF cable and data 'Y'cables – to the modems and the CRS-170A. Chapter 4. CABLES AND CONNECTIONS

3.7 CDM-600L (CLM-9600L) Operation in 1:1 Redundancy

CLM-9600L Open Network Satellite Modem Installation and Operation Manual (CEFD P/N MN/CLM9600L.IOM)

The CDM-600L (CLM-9600L) Open Network Satellite Modems need no unique special 1:1 configuration settings. However, for correct operation of the CRS-170A, the CDM-600Ls must have the following installed:

- ***Firmware Version 1.1.4 (or higher)***
- ***Hardware Revision 3***

If the modems do not meet this requirement, contact Comtech EF Data. Firmware updates are free and may be downloaded from the CEFD web page. Hardware revision upgrades must be performed at CEFD.

3.8 SDM-300L3 Operation in 1:1 Redundancy

SDM-300L3 Satellite Modem Installation and Operation Manual (CEFD P/N MN/CLM9600L.IOM)

The SDM-300L3 Satellite Modems need no unique special 1:1 configuration settings. However, for correct operation of the CRS-170A, the SDM-300L3 must have the following installed:

- ***Firmware Version 1.1.4 (or higher)***
- ***Hardware Revision 3***

If the modems do not meet this requirement, contact Comtech EF Data. Firmware updates are free and may be downloaded from the CEFD web page. Hardware revision upgrades must be performed at CEFD.

Notes:

3.9 CRS-170A Switch DIP Settings

The 'Switch Conditions' DIP switches are set depending upon the type of Tx or Rx traffic conditions resultant of switchover. Some modems have additional settings or alarm masks that affect conditions – refer to the individual modem manual for detailed explanations.

Figure 3-4 shows the DIP switches for setting the '**Mode'** and '**Switch Conditions**' on the Antenna Side of the CRS-170A L-Band 1:1 Redundancy Switch (towards the BUC and LNB). The difference of the '**Mode'** DIP switch silk screening between the original and current (i.e., Rev. A and later) versions of the CRS-170A is illustrated here.

On the next page, **Table 3-1** illustrates the settings for the '**Mode'** DIP switch set on a per-modem basis, and the '**Switch Conditions'** DIP switch settings that determine switchover functionality for a given redundancy configuration.

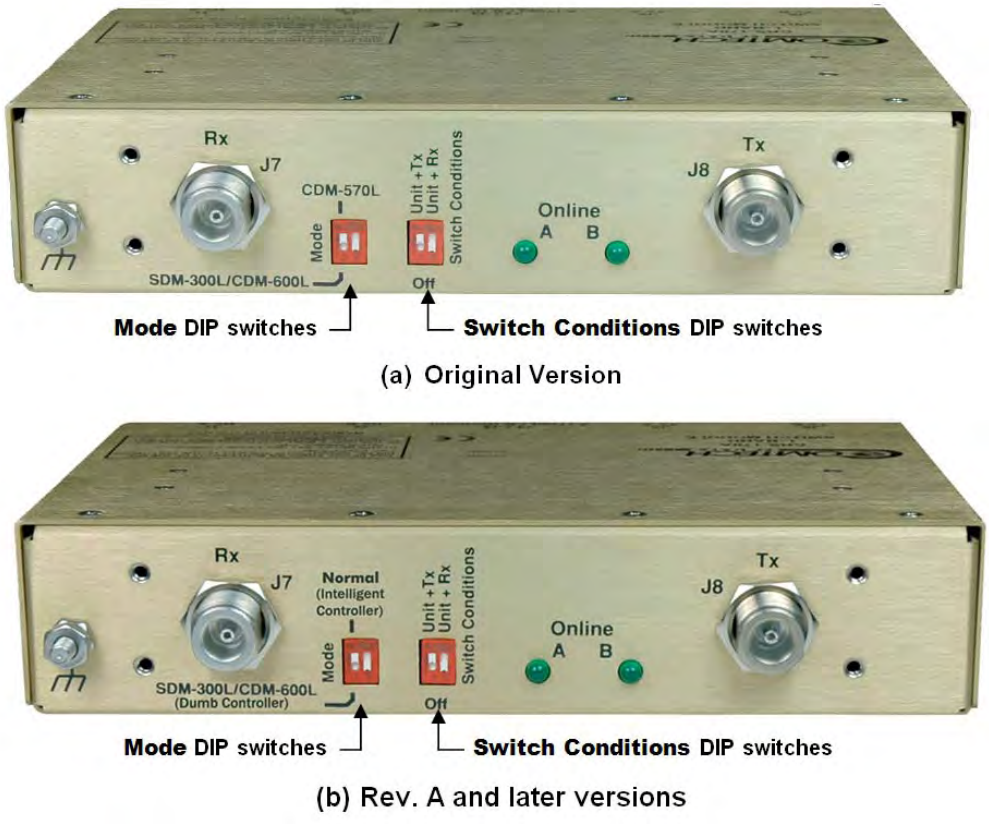


Figure 3-4. CRS-170A Antenna Side – DIP Switches

Table 3-1. CRS-170A DIP Switch Settings

'Mode' DIP Settings			
Modem	DIP	Left Switch	Right Switch
CDM-625/A CDM-840		Up	Down
CDM-750 (L-Band)		Up	Down
CDM-570L		Up	Down
CDM-700 (L-Band)		Up	Down
CDM-710 (L-Band)		Up	Down
CDM-710G (L-Band)		Up	Down
CDM-600L (CLM-9600L)		Down	Up
SDM-300L3		Down	Down

'Switch Conditions' DIP Settings			
DIP	Left Switch	Right Switch	Result
	Down (Off)	Down	Switchover upon a Unit fault
	Up	Down	Switchover upon a Unit or Tx Traffic fault
	Down	Up	Switchover upon a Unit or Rx Traffic fault
	Up	Up	Switchover upon a Unit or Tx Traffic or Rx Traffic fault

Chapter 4. CABLES AND CONNECTIONS

4.1 Overview

When assembling a Comtech EF Data 1:1 Redundancy System, in addition to purchasing the desired modem pair (one Redundant modem, one Traffic modem), you must also purchase a redundancy kit tailored to that modem choice. This kit provides – in addition to the CRS-170A L-Band 1:1 Redundancy Switch module – all cables and components required for interconnection of the redundant configuration to various interfaces (i.e., control, IF, and data), excluding Ethernet, which requires user-provided cables and Layer 2 switching.

The modem-specific sections in this chapter identify the redundancy kit required for that particular configuration. The individual redundancy kit item(s) required to assemble specific interface examples are further identified.

- ***It is physically impossible to connect all available data interface solutions within a single 1:1 redundancy system at a given time. For example, when using the CDM-625/A in a 1:1 system, you are unable to establish an ASI interface together with a G.703 Unbalanced interface, or an EIA-422/232 interface together with an HSSI interface. Therefore, the quantities of cables and accessories furnished with each redundancy kit have been predetermined with this operational limitation taken into consideration.***

- ***The type of 1:1 Y-Splitter cable required for modem-to-user interconnection depends on your data interface. It is essential to ensure that the control and IF connections, both Rx and Tx, are made correctly.***

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4.2 Cabling to the CDM-625/A

1. ***For information on the CDM-625/A's 1:1 auto-enable functionality, see:***
   - **Chapter 3. MODEM AND SWITCH CONFIGURATION**
   - **CDM-625/A Advanced Satellite Modem Installation and Operation Manual (CEFD P/N MN-CDM625/A)**

2. ***For information on the cables and cable assemblies specified in this section, see:***
   - **Appendix A. CABLE DRAWINGS**

4.2.1.1 CRS-170A → CDM-625/A Control and IF Interface Cabling Kit KT-0000160

Terrestrial data interface components/kits must be ordered separately. See Sect. 4.2.4 for CDM-625/A terrestrial data interface configuration and connection examples and details.

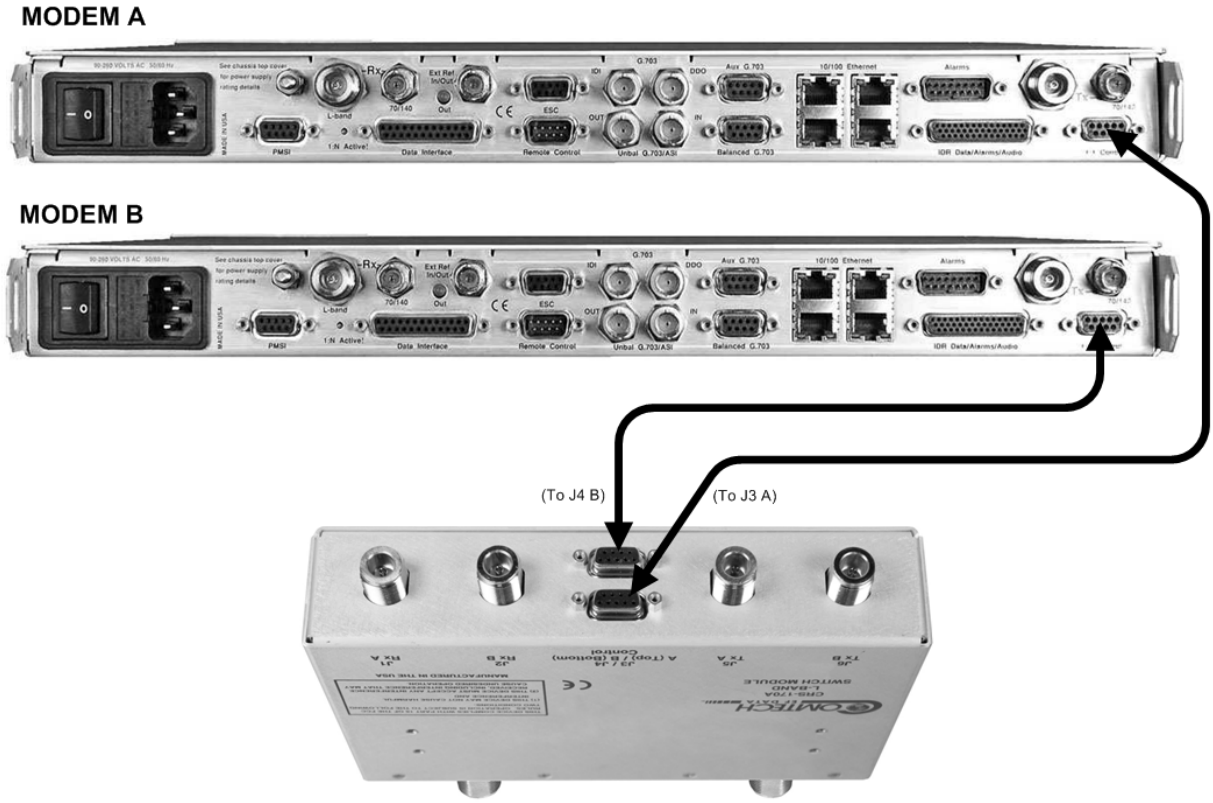
Comtech EF Data's KT-0000160 1:1 Redundancy Control/IF Interface Cabling Kit is required for control and L-Band switch-to-modem cabling connections:

KT-0000160 1:1 Redundancy Control / IF Interface Cabling Kit (CRS-170A → CDM-625/A)				
CEFD Part No.	Qty	Description	Used For	Ch. 4 Fig
PL/10129-1	1	CRS-170A Switch – Top Assembly	1:1 Redundancy	4-1 thru 4-3
CA/WR9378-4	2	Control Cable – Universal, DB-9M → DB-9M, 4'	Modem → Switch Control	4-1
CA/RF10453-4	4	RoHS-Compliant Cable – IF (Tx/Rx), 50Ω Type 'N', 4'	Modem → Switch IF Interface	4-2 4-3

See **Sect. 4.2.2** in this chapter for details of the CDM-625/A Modem-to-Switch Control Interface connection, and **Sect. 4.2.3** for details of the CDM-625/A Modem-to-Switch IF Interface connections. Here, **Figure 4-1** through **Figure 4-3** show how to connect a pair of CDM-625/A modems together with the CRS-170A L-Band 1:1 Redundancy Switch module; the table that accompanies each figure lists the cables provided in KT-0000160 for this initial setup.

4.2.2 Modem-to-Switch Control Interface Connection

When connecting the Control cable between the CRS-170A and the modems, ensure that screw locks on the 'D' type connectors are securely fastened. This will prevent the accidental unmating of the cable, particularly when a standby unit is being removed or replaced.



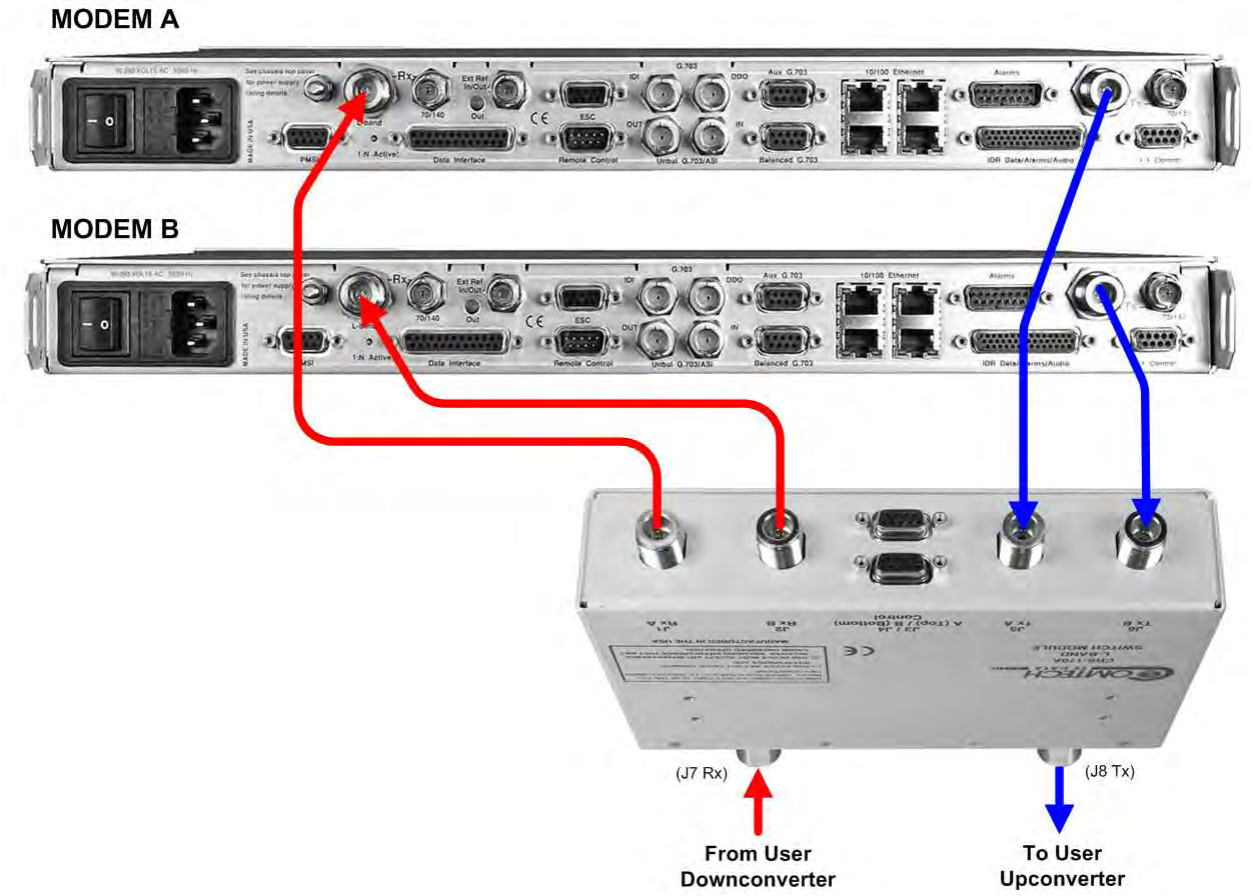
CEFD Part No.	Qty	Description
CA/WR9378-4	2	Control Cable – Universal, DB-9M, 4'

Figure 4-1. CDM-625/A Modem-to-Switch Control Connections

4.2.3 Modem-to-Switch IF Interface Connection

> *EXAMPLE:* ***The Tx IF from ' Modem A' connects to the Tx IF port 'J5 Tx A' on the CRS-170A; similarly, the Tx IF from 'Modem B' connects to the Tx IF port 'J6 Tx B' on the CRS-170A.***
>
> ***The same logic applies for the Rx IF connections. It is important to note that failure to observe this requirement will result in system malfunction.***

4.2.3.1 Modem-to-Switch L-Band (Rx/Tx) IF Interface Connection

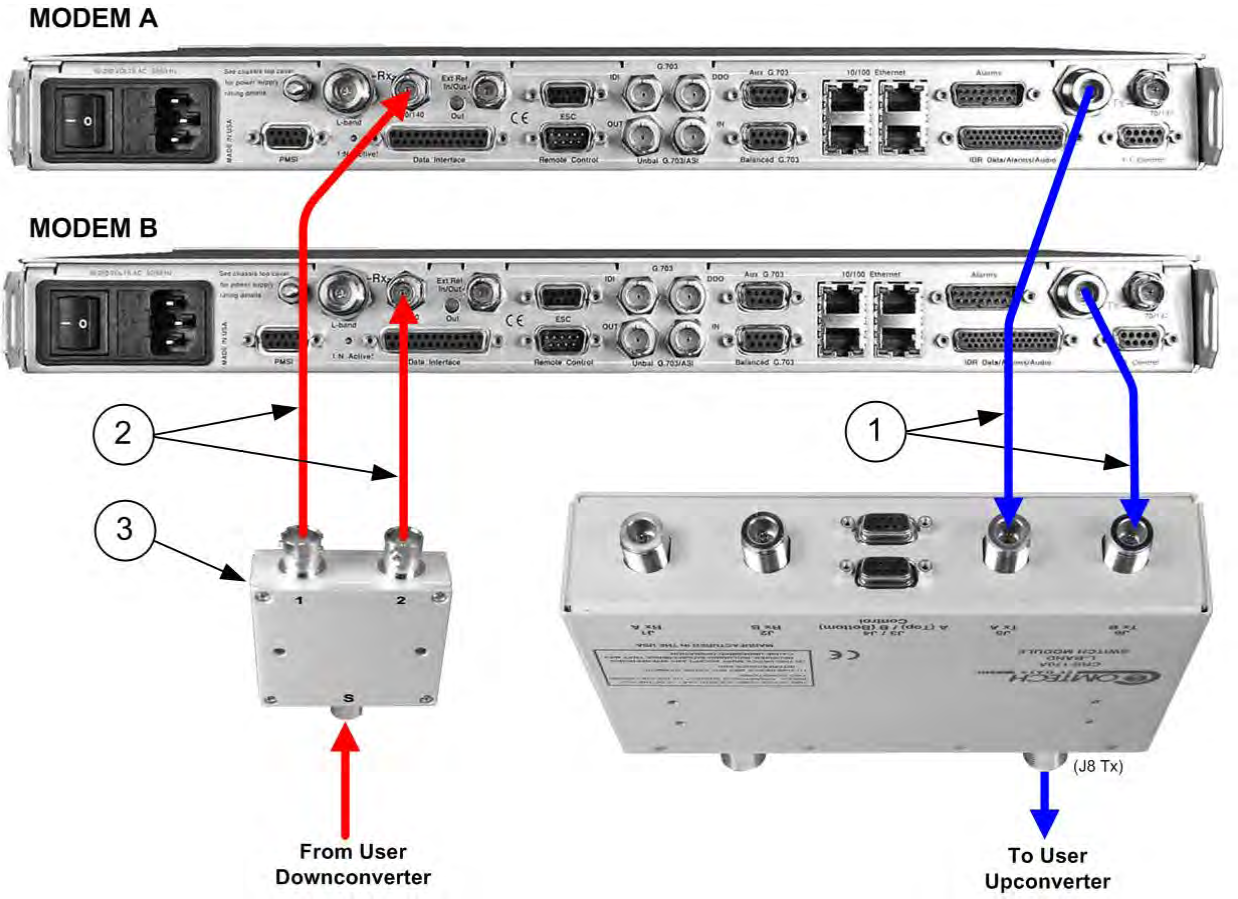


CEFD Part No.	Qty	Description
CA/RF10453-4	4	RoHS-Compliant Cable – IF (Tx/Rx), 50Ω Type 'N', 4'

Figure 4-2. CDM-625/A Modem-to-Switch L-Band IF Connections

4.2.3.2 Modem-to-Switch L-Band Tx / 70/140 MHz Rx IF Interface Connection

***If the Tx IF is L-Band and the Rx IF is 70/140MHz, additional items may be purchased for this option, as shown here in* Figure 4-3.**



Item	CEFD Part No.	Qty	Description
1	CA/RF10453-4	2	RoHS-Compliant Cable – IF (Tx/Rx), 50Ω Type 'N', 4'
2	CA/BNC75OHM	2	Cable – IF Type 'BNC', 1'
3	RF/SA32KC-IN/OUT	1	Combiner – 2-way w/bracket, 0.25-300 MHz, 75Ω BNC

Figure 4-3. CDM-625/A Modem-to-Switch L-Band Tx / 70/140 MHz Rx IF Connections

4.2.4 Modem-to-User Data Interface Connections and Examples

Appendix A. CABLE DRAWINGS

The data cables and components identified in each of the examples that follow in this section must be purchased separately, as required.

In addition to the control and IF switch-to-modem cabling shown previously, a number of data interface configurations are available for the CDM-625 and CDM-625A Advanced Satellite Modems. The block diagram shown in **Figure 4-4** is typical for the examples shown in **Sects. 4.2.4.1** through **4.2.4.9**.

With the exception of the 10/100 Ethernet Interface configuration shown in **Figure 4-13**, where customer-supplied Ethernet cables and Layer 2 switches are used, one cable/component set per 1:1 modem pair is required for each user interface (see examples for specified quantities).

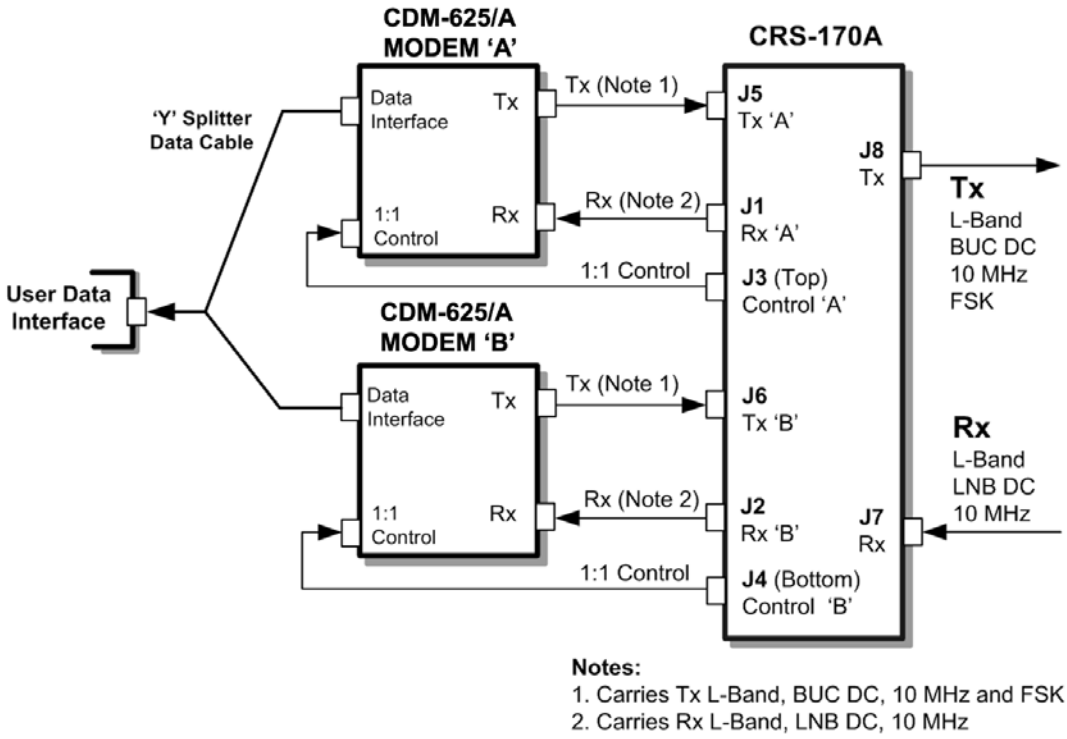


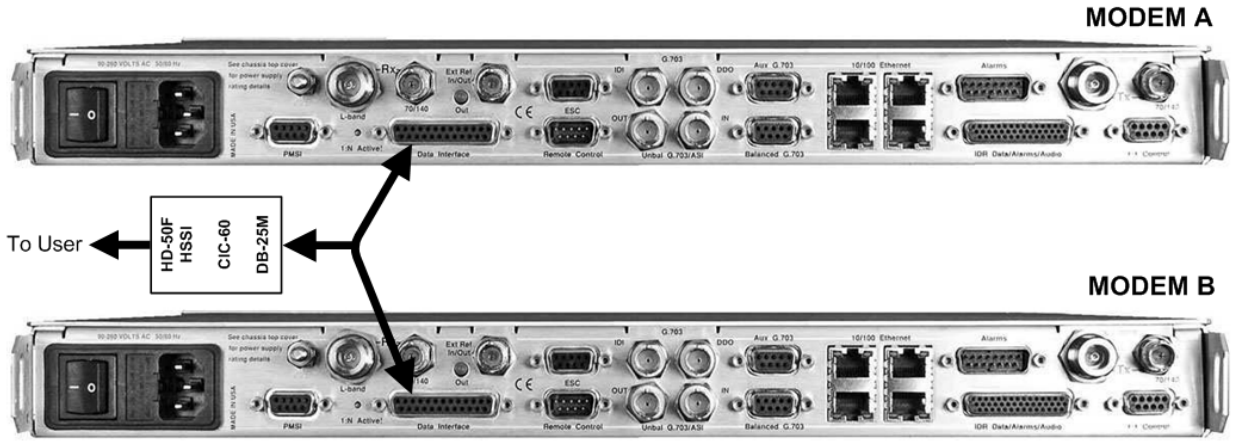
Figure 4-4. CDM-625/A Block Diagram: User → Modem → Switch → Traffic

4.2.4.1 EIA-422/232, V.35 Interface Example

CEFD Part No.	Qty	Description
CA/RB10461-1	1	Cable – 1:1 'Y' Splitter, (2X) DB-25M → DB-25F

Figure 4-5. CDM-625/A EIA-422/232, V.35 1:1 Example

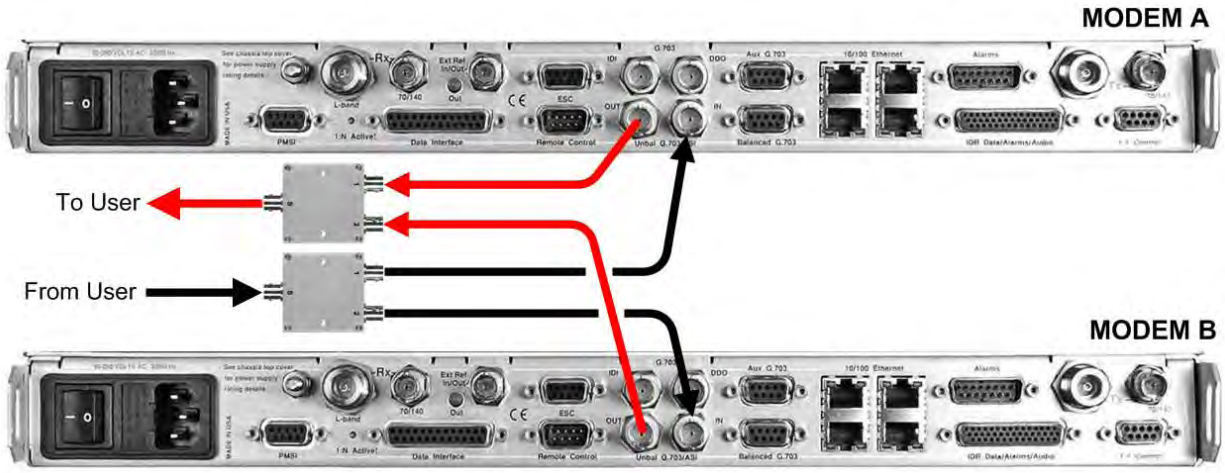
4.2.4.2 HSSI Interface Example



CEFD Part No.	Qty	Description
CA/RB10461-1	1	Cable – 1:1 'Y' Splitter, (2X) DB-25M → DB-25F
PL-0000307	1	CIC-60 – Interconnect Converter, DB-25M → HD-50F (SCSI-II)

Figure 4-6. CDM-625/A HSSI 1:1 Example

4.2.4.3 ASI Interface Example



KT/12579 ASI 75Ω Interface Kit		
CEFD Part No.	Qty	Description
CA/BNC75OHM	4	Cable – IF BNC, 75Ω, 1’
RF/SA32KC-IN/OUT	2	Combiner – 2-way w/Bracket, 0.25-300 MHz, 75Ω BNC

Figure 4-7. CDM-625/A ASI 1:1 Example

4.2.4.4 Quad E1 Interface Example

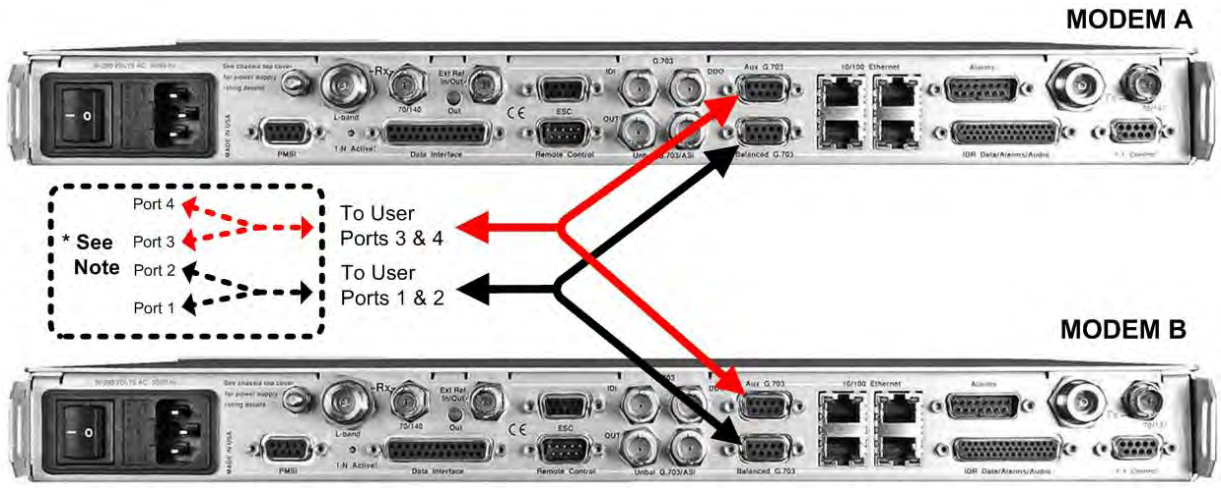
The G.703 Balanced and Auxiliary G.703 DB-9F single connectors are used for Quad E1 operation. **Note the following:**

1. As shown **Figure 4-8**, the CA-0000071 'Y' Cable provides for two ports of E1 (i.e., Ports 1/2 **-or-** Ports 3/4).

2. If you desire three or four *separate* ports of E1 (i.e., Port 1 *and* Port 2 ***-or-*** Port 3 *and* Port 4), then optional adapter cables may be purchased from Comtech EF Data to adapt the G.703 Balanced and Auxiliary G.703 DB-9F single connector pairs to outgoing Quad E1 connector pairs as follows:

Cable (CEFD Part No.)	Converts (1) 9-pin Type 'D' (DB-9F) paired connection (e.g., Modem A *AND* Modem B G.703 Balanced connector pair –*or*– Modem A *AND* Modem B Auxiliary G.703 connector pair) to:	See App. A Fig.
CA-0000163	(2) 15-pin Type 'D' (DB-15F) connectors	A-9
CA-0000164	(2) RJ-48 female connectors	A-10
KT-0000122	(4) BNC 75Ω female connectors – (2) Tx, (2) Rx	A-11

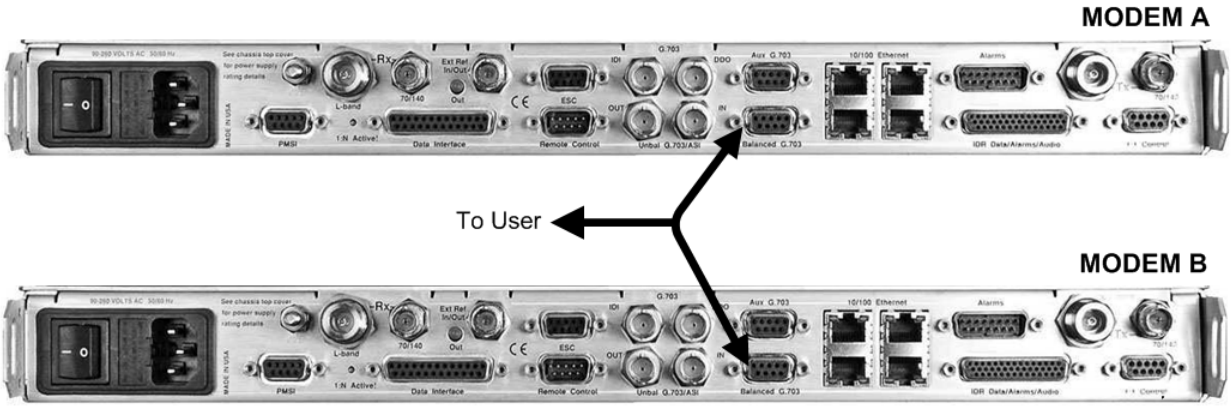
All three cabling options plug into the single 'To User' connector side of each CA-0000071 'Y' Splitter cable used.



CEFD Part No.	Qty	Description
CA-0000071	2 Note 1	Cable – 1:1 'Y' Splitter, (2X) DB-9M → DB-9F, 8"

Figure 4-8. CDM-625/A Quad E1 1:1 Example

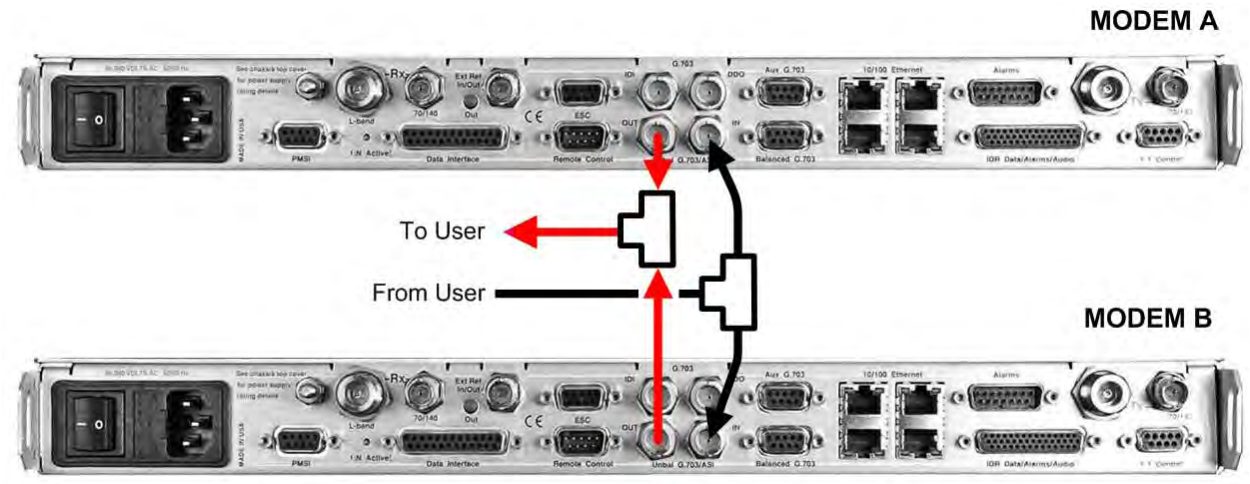
4.2.4.5 G.703 Balanced Interface Example



CEFD Part No.	Qty	Description
CA-0000071	1	Cable – 1:1 'Y' Splitter, (2X) DB-9M → DB-9F, 8"

Figure 4-9. CDM-625/A G.703 Balanced 1:1 Example

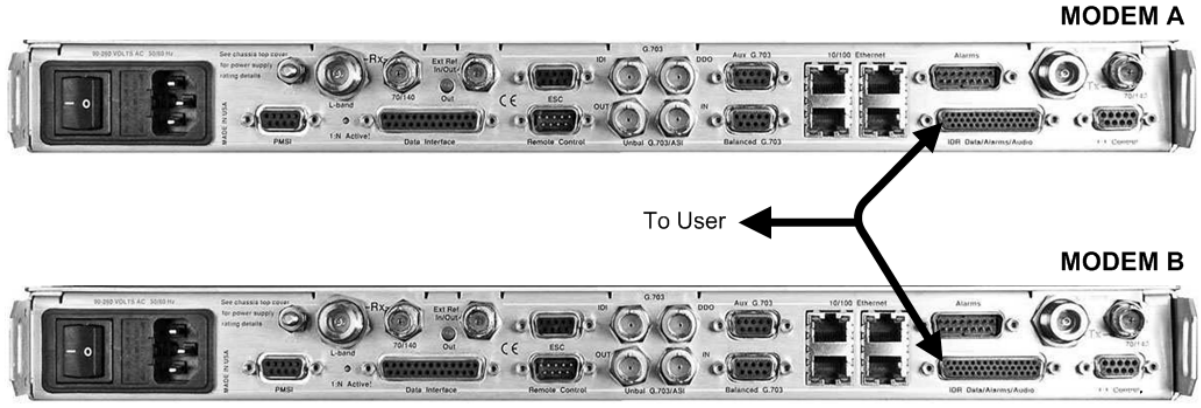
4.2.4.6 G.703 Unbalanced Interface Example



KT/10553-1 G.703 Unbalanced Interface Kit		
CEFD Part No.	Qty	Description
CA/BNC75OHM	4	Cable – IF BNC, 1'
CN/BNC-TEE-JPJ	2	T-Adapter, 50Ω BNC

Figure 4-10. CDM-625/A G.703 Unbalanced 1:1 Example

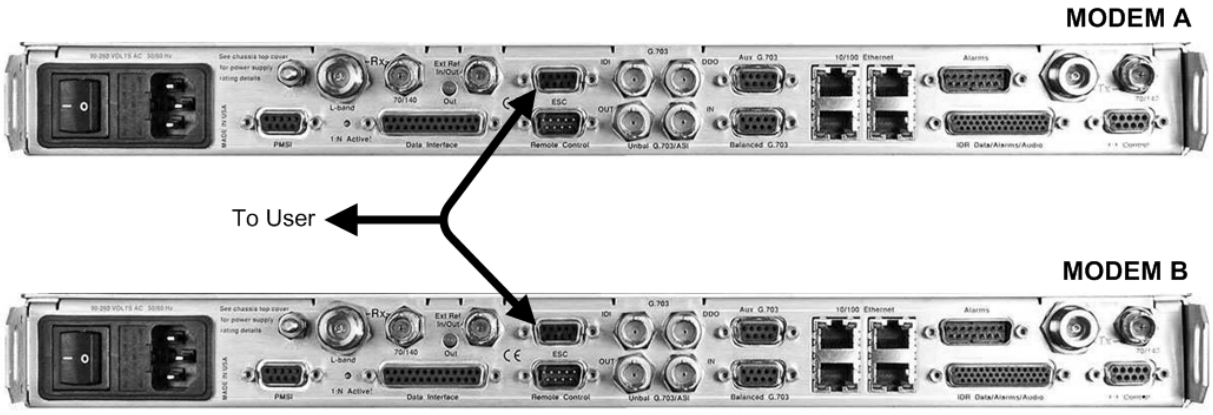
4.2.4.7 Overhead Interface Example



CEFD Part No.	Qty	Description
CA-0000070	1	Cable – 1:1 'Y' Splitter, (2X) HD-44M → HD-44F, 8"

Figure 4-11. CDM-625/A Overhead 1:1 Example

4.2.4.8 Engineering Service Channel (ESC) Interface Example



CEFD Part No.	Qty	Description
CA-0000071	1	Cable – 1:1 'Y' Splitter, (2X) DB-9M → DB-9F, 8"

Figure 4-12. CDM-625/A ESC 1:1 Example

4.2.4.9 10/100 Ethernet Interface Examples

4.2.4.9.1 Managed Switch Mode (with/without IP Packet Processor)

Figure 4-13 shows a block diagram and cabling example of a CDM-625/A 1:1 modem configuration using the 10/100 Ethernet Interface in Managed Switch (Ethernet Bridge) Mode. Direct connection is made via one to four RJ-45 ports using user-provided Ethernet cables and Layer 2 switches, so no cables or kit is required. The cabling example depicts all four Ethernet ports used.

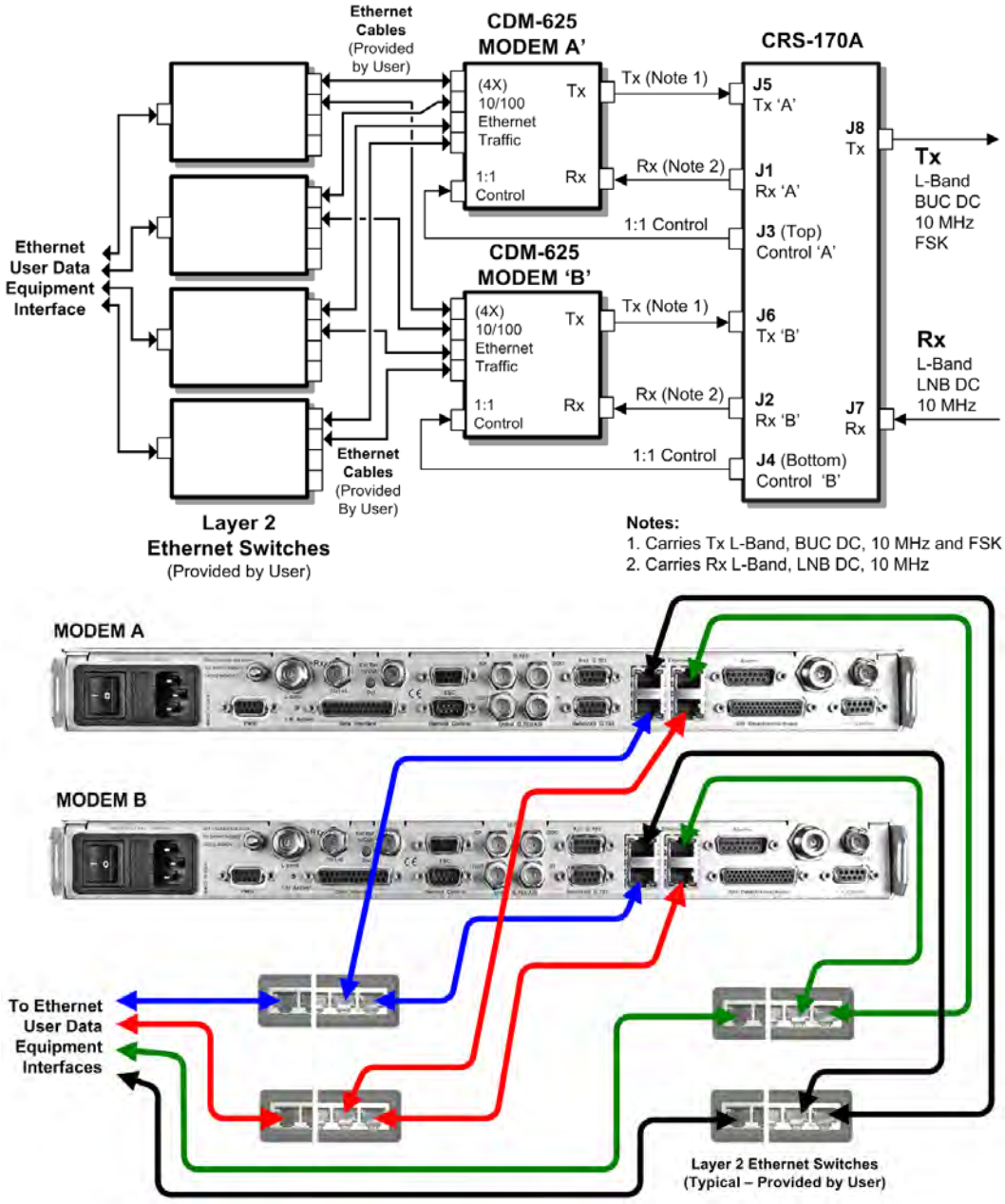


Figure 4-13. CDM-625/A 10/100 Ethernet 1:1 Example – Managed Switch Mode

4.2.4.9.2 Router Mode (Optional IP Packet Processor Required)

Figure 4-14 shows a block diagram and cabling example of a CDM-625/A 1:1 modem configuration using the 10/100 Ethernet Interface in Router Mode, with the optional IP Packet Processor ***installed and enabled***. Direct connection is made via ***only one of four*** RJ-45 ports using user-provided Ethernet cables and a Layer 2 switch, so no cables or kit is required.

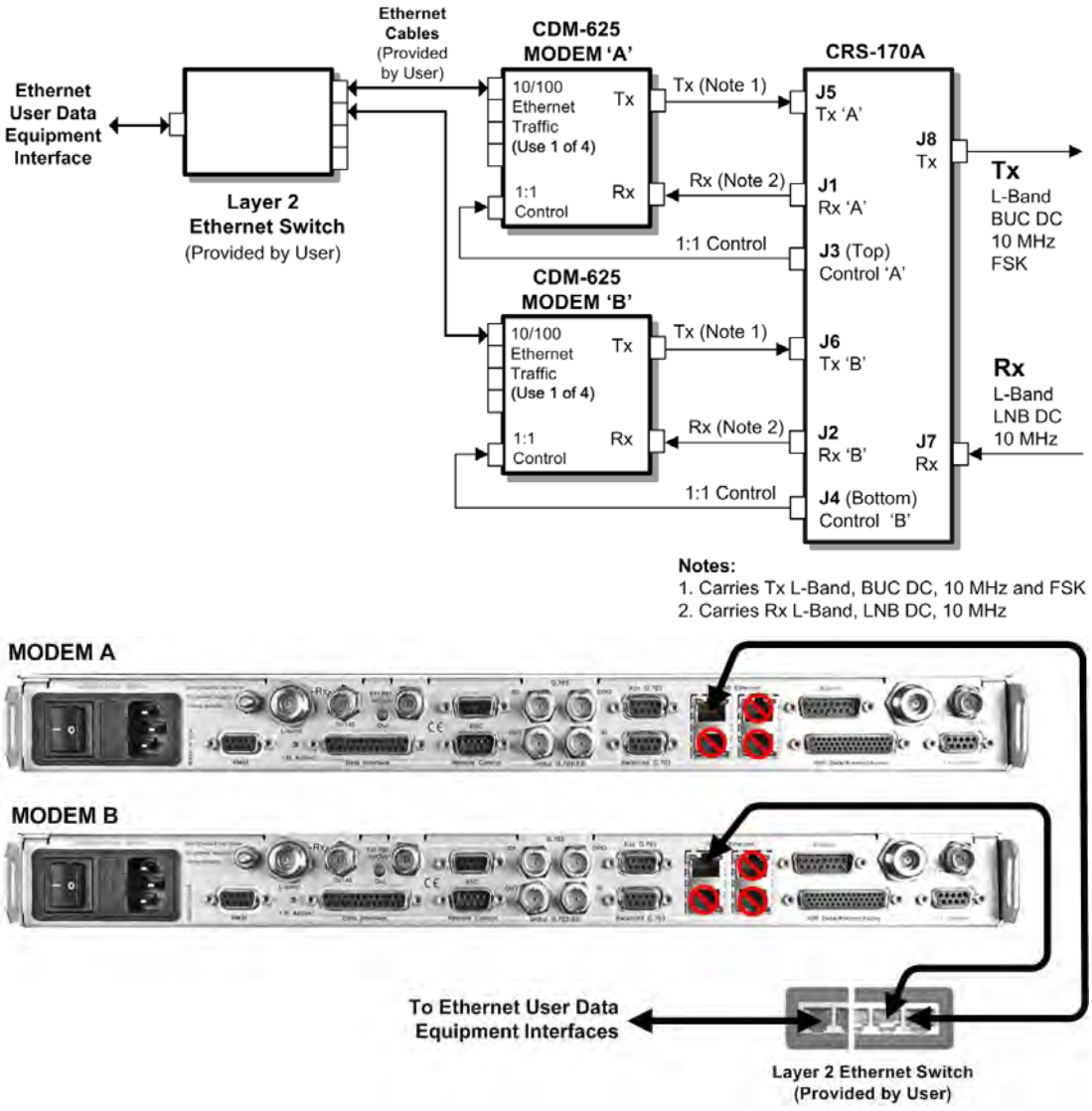


Figure 4-14. CDM-625/A 10/100 Ethernet 1:1 Example – Router Mode

4.2.4.9.3 Data Interface Connections using IP Sub-Mux

Chapter 15. IP SUB-MUX in CDM-625/A Advanced Satellite Modem Installation and Operation Manual (CEFD P/N MN-CDM625/A)

Sub-Mux is a secondary framing structure which combines one to four ports of 10/100 Ethernet (IP) traffic – as shown in **Figure 4-13** – with any currently available combination of framing and interface type (excluding IP itself) – as shown in **Figure 4-5** through **Figure 4-12**. The composite data rate to the modulator and from the demodulator is referenced to the primary, non-IP data interface rate by a specific, user-selected ratio.

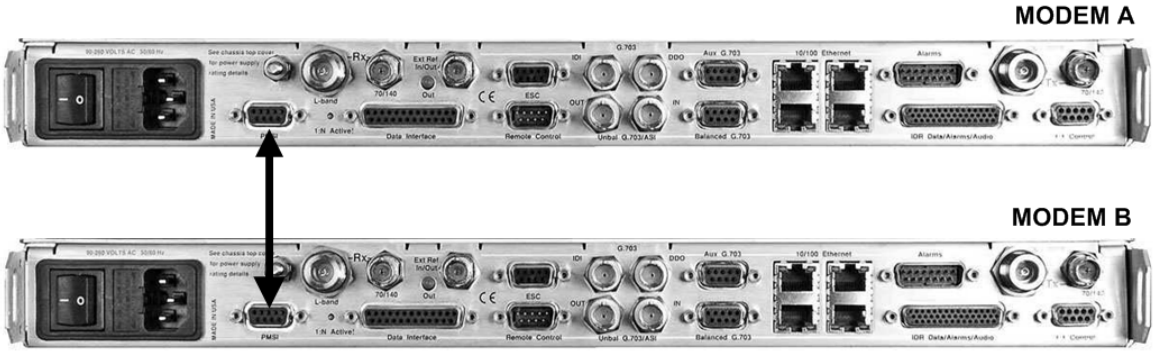
4.2.4.10 PMSI Interface Example

The **Pre-Mapped Symbol Interface (PMSI)** is a function associated with DoubleTalk® Carrier-in-Carrier® (CnC®) that permits the modulator in a selected unit to provide a direct copy of its output (the outbound interferer) to the offline modem in a 1:1 pair. The offline modem will then take the PMSI signal and use it for its own CnC® reference. The PMSI is an EIA-485 point-to-point bus system where one device transmits, and the other device on the bus is configured to receive. See **Figure 4-15** to connect and secure the CDM-625/A Multi-drop CnC® Plus 1:1 Cable CA-0000276 (2X DB-9M, 1'), required between the Redundant Modem and each Traffic Modem ***using CnC***.

The CA-0000276 Multi-Drop CnC PLUS 1:1 Cable bypasses the CRS-170A L-Band 1:1 Redundancy Switch.

If CnC® is enabled with a CDM-625/A 1:1 pair, before any switch configurations can be made, specific configuration steps must be taken with each CDM-625/A to ensure proper operation of the pair within a configured CRS-170A L-Band 1:1 Redundancy System.

Chapter 3. MODEM AND SWITCH CONFIGURATION



CEFD Part No.	Qty	Description
CA-0000276	1	CDM-625/A Data Cable – Shielded, Multi-drop CnC® Plus, 1:1, (2X) DB-9M, 1'

Figure 4-15. CDM-625/A PMSI 1:1 Example

Notes:

4.3 Cabling to the CDM-840

1. ***For information on the CDM-840's 1:1 auto-enable functionality, see:***
   - **Chapter 3. MODEM AND SWITCH CONFIGURATION**
   - **CDM-840 Remote Router Installation and Operation Manual (CEFD P/N MN-CDM840)**

2. ***For information on the cables and cable assemblies specified in this section, see:***
   - **Appendix A. CABLE DRAWINGS**

4.3.1 CRS-170A → CDM-840 Control and IF Interface Cabling Kit KT-0000160

Terrestrial data interface components/kits must be ordered separately. See Sect. 4.3.4 for CDM-840 terrestrial data interface configuration and connection examples and details.

Comtech EF Data's KT-0000160 1:1 Redundancy Control/IF Interface Cabling Kit is required for control and L-Band switch-to-unit cabling connections:

KT-0000160 1:1 Redundancy Control / IF Interface Cabling Kit (CRS-170A → CDM-840)				
CEFD Part No.	Qty	Description	Used For	Ch. 4 Fig
PL/10129-1	1	CRS-170A Switch – Top Assembly	1:1 Redundancy	4-16 4-17
CA/WR9378-4	2	Control Cable – Universal, DB-9M → DB-9M, 4'	CDM-840 → Switch Control	4-16
CA/RF10453-4	4	RoHS-Compliant Cable – IF (Tx/Rx), 50Ω Type 'N', 4'	CDM-840 → Switch IF Interface	4-17

See **Sect. 4.3.2** and **Figure 4-16** in this chapter for details of the CDM-840 Unit-to-Switch Control Interface connection, and **Sect. 4.3.3** and **Figure 4-17** for details of the CDM-840 Unit-to-Switch IF Interface connections. Information for connecting a pair of CDM-840s together with the CRS-170A L-Band 1:1 Redundancy Switch module is provided here; the table that accompanies each figure lists the cables provided in KT-0000160 for this initial setup.

4.3.2 Unit-to-Switch Control Interface Connection

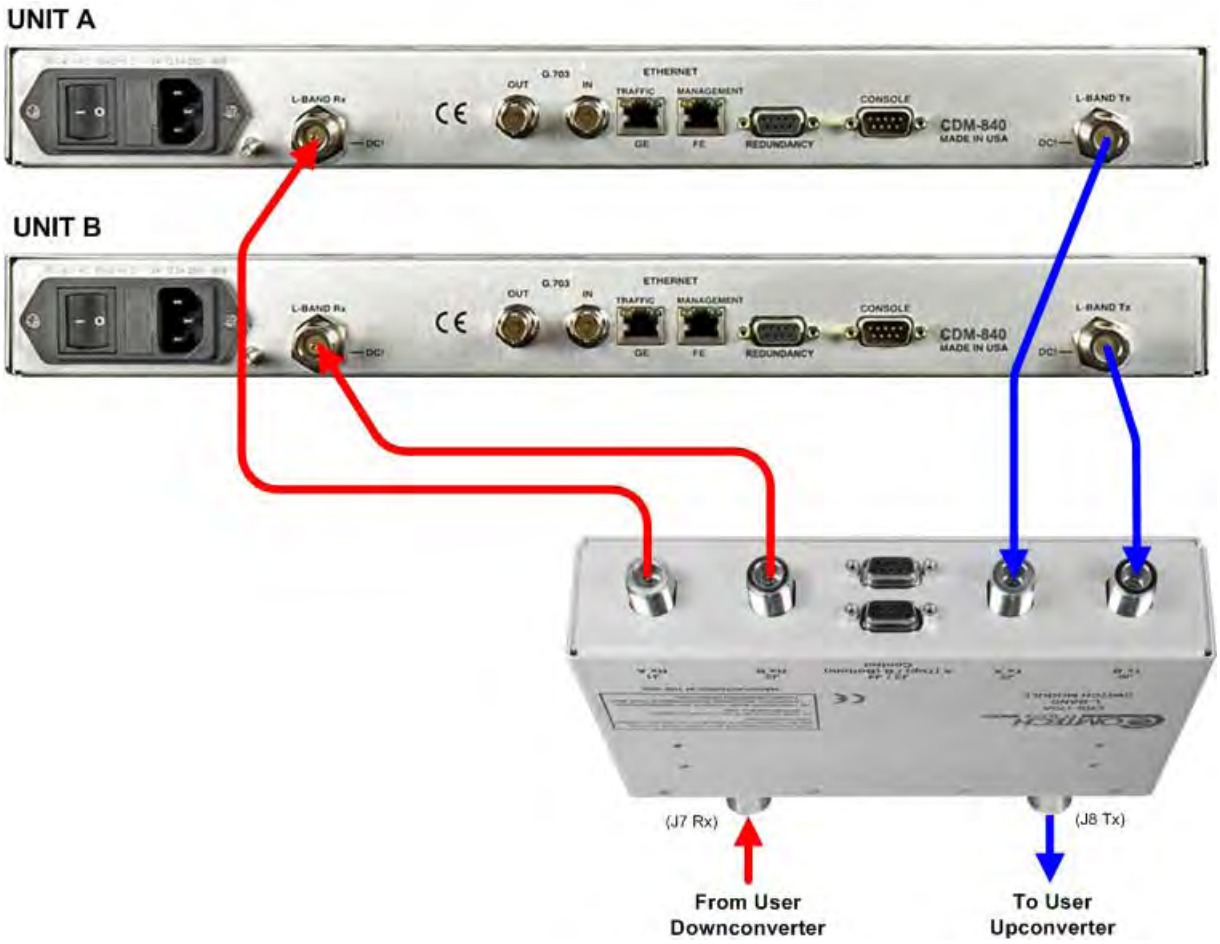
When connecting the Control cable between the CRS-170A and the CDM-840s, ensure that screw locks on the 'D' type connectors are securely fastened. This will prevent the accidental unmating of the cable, particularly when a standby unit is being removed or replaced.

CEFD Part No.	Qty	Description
CA/WR9378-4	2	Control Cable – Universal, DB-9M, 4'

Figure 4-16. CDM-840 Unit-to-Switch Control Connections

4.3.3 Unit-to-Switch IF Interface Connection

> *EXAMPLE:* ***The Tx IF from ' Unit A' connects to the Tx IF port 'J5 Tx A' on the CRS-170A; similarly, the Tx IF from 'Unit B' connects to the Tx IF port 'J6 Tx B' on the CRS-170A.***
>
> ***The same logic applies for the Rx IF connections. It is important to note that failure to observe this requirement will result in system malfunction.***



CEFD Part No.	Qty	Description
CA/RF10453-4	4	RoHS-Compliant Cable – IF (Tx/Rx), 50Ω Type 'N', 4'

Figure 4-17. CDM-840 Unit-to-Switch L-Band IF Connections

4.3.4 Unit-to-User Data Interface Connections and Examples

In addition to the control and IF switch-to-unit cabling shown in the previous section, the CDM-840 features a 10/100/1000 Gigabit Ethernet data interface and a G.703 Unbalanced E1 data interface that is used with the CDM-840's optional E1 Interface / RAN Optimization Hardware / FAST Feature upgrade.

With the exception of the 10/100/1000 Gigabit Ethernet Interface configuration shown in **Sect. 4.3.4.1**, where user-provided Ethernet cables and hub are used, one cable/component set per 1:1 unit pair is required for each user interface (see examples for specified quantities).

4.3.4.1 RJ-45 Gigabit Ethernet Data Interface Example

Figure 4-18 shows the block diagram and a cabling example for a CDM-840 1:1 configuration using the RJ-45 10/100/1000 Gigabit Ethernet port. Direct connection is made with user-provided Ethernet cables and a Layer 2 switche, so no cables or kit is required.

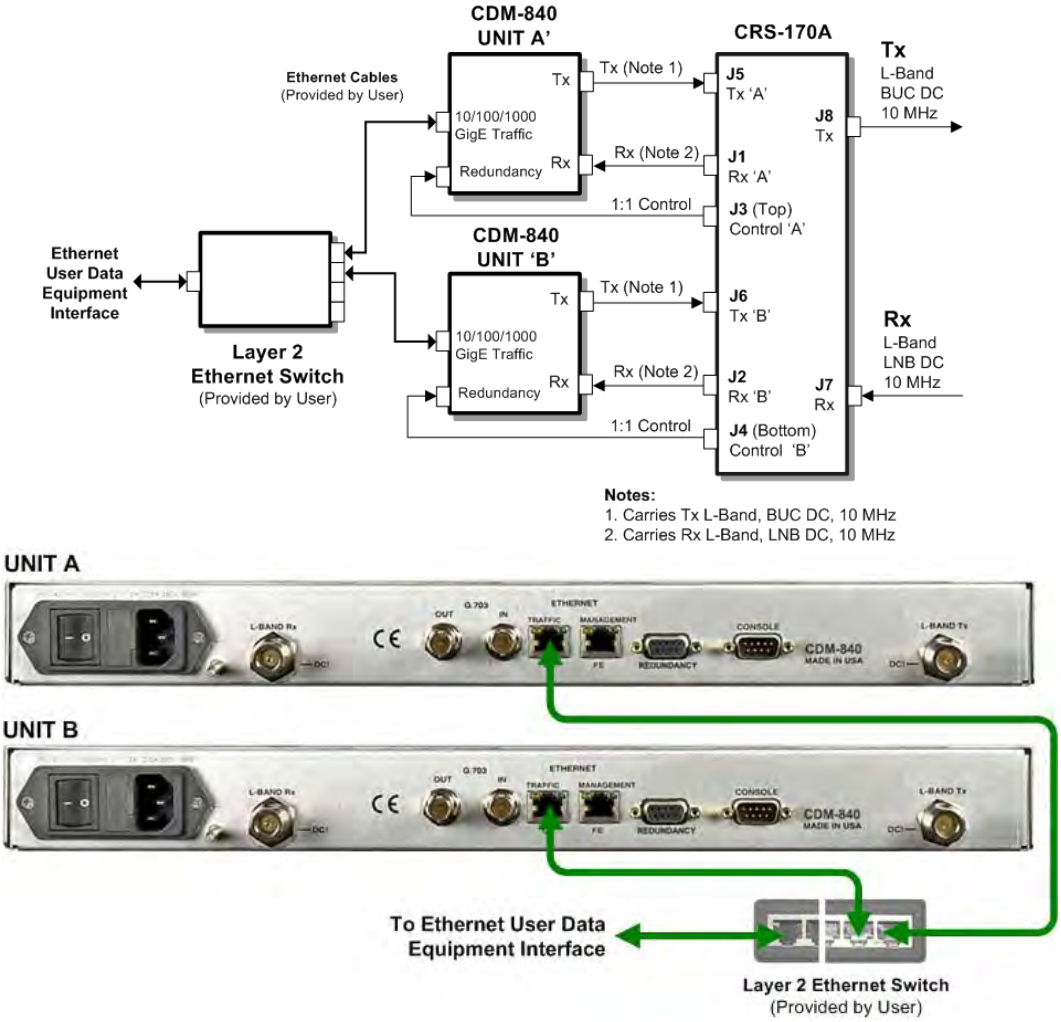
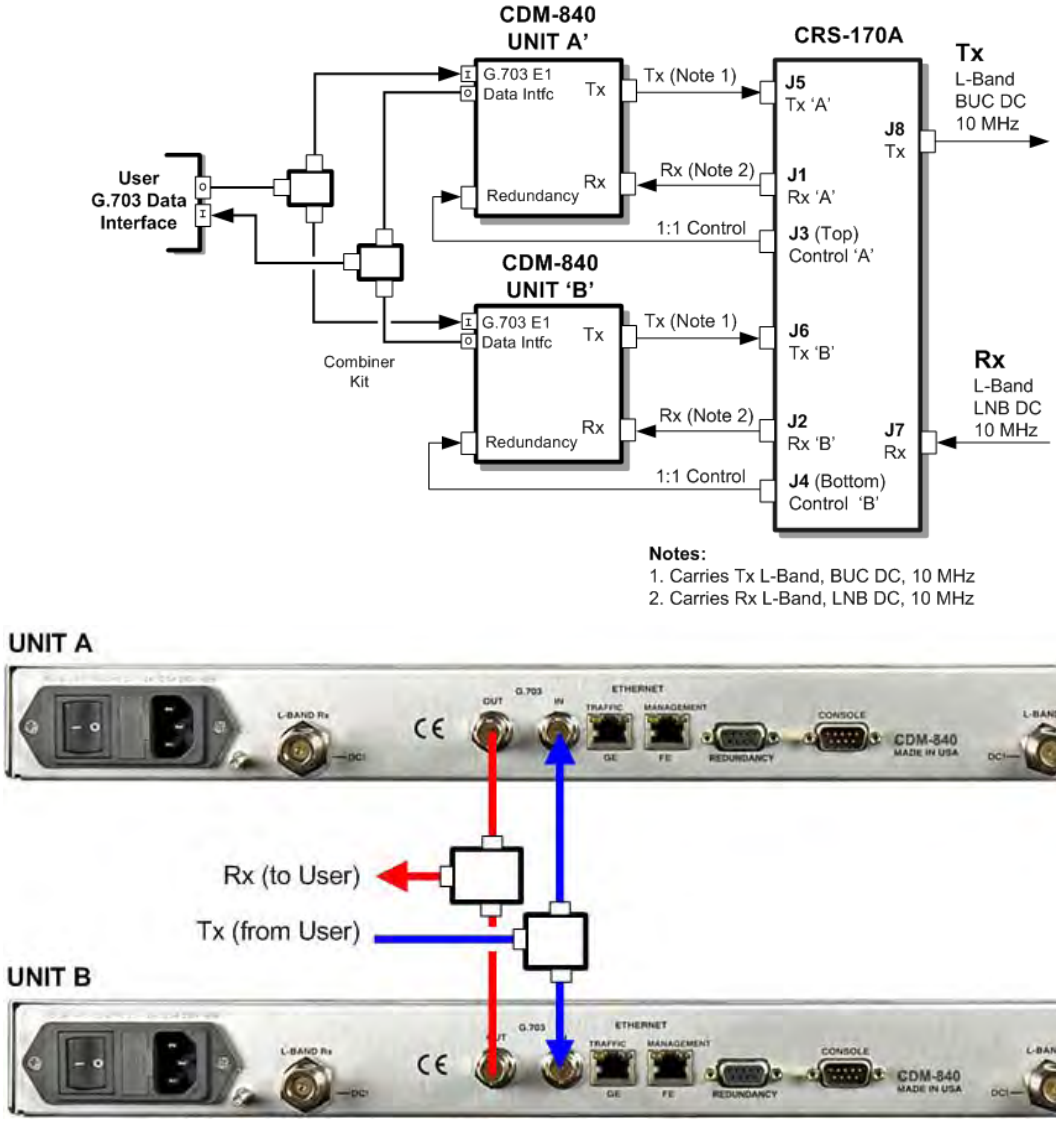


Figure 4-18. CDM-840 RJ-45 Gigabit Ethernet 1:1 Example

4.3.4.2 KT/12542 G.703 75Ω Data Interface Kit (for G.703 Unbalanced E1)

Figure 4-19 shows the block diagram and a cabling example for a CDM-840 1:1 configuration using the G.703 Unbalanced E1 Data Interface Kit KT/12542 that is required with the CDM-840's optional E1 Interface / RAN Optimization Hardware / FAST Feature upgrade.



KT/12542 G.703 75Ω Interface Cabling Kit (for G.703 Unbalanced E1 traffic)		
CEFD Part No.	Qty	Description
CA/BNC75OHM	4	Cable – IF, BNC 75Ω, 1'
RF/SA32KC-IN/OUT	2	Combiner – 2-Way w/Bracket, 0.25-300 MHz, BNC 75Ω

Figure 4-19. CDM-840 Unbalanced G.703 E3/T375Ω Interface Kit – KT/12542

Notes:

4.4 Cabling to the CDM-750 or CDM-760

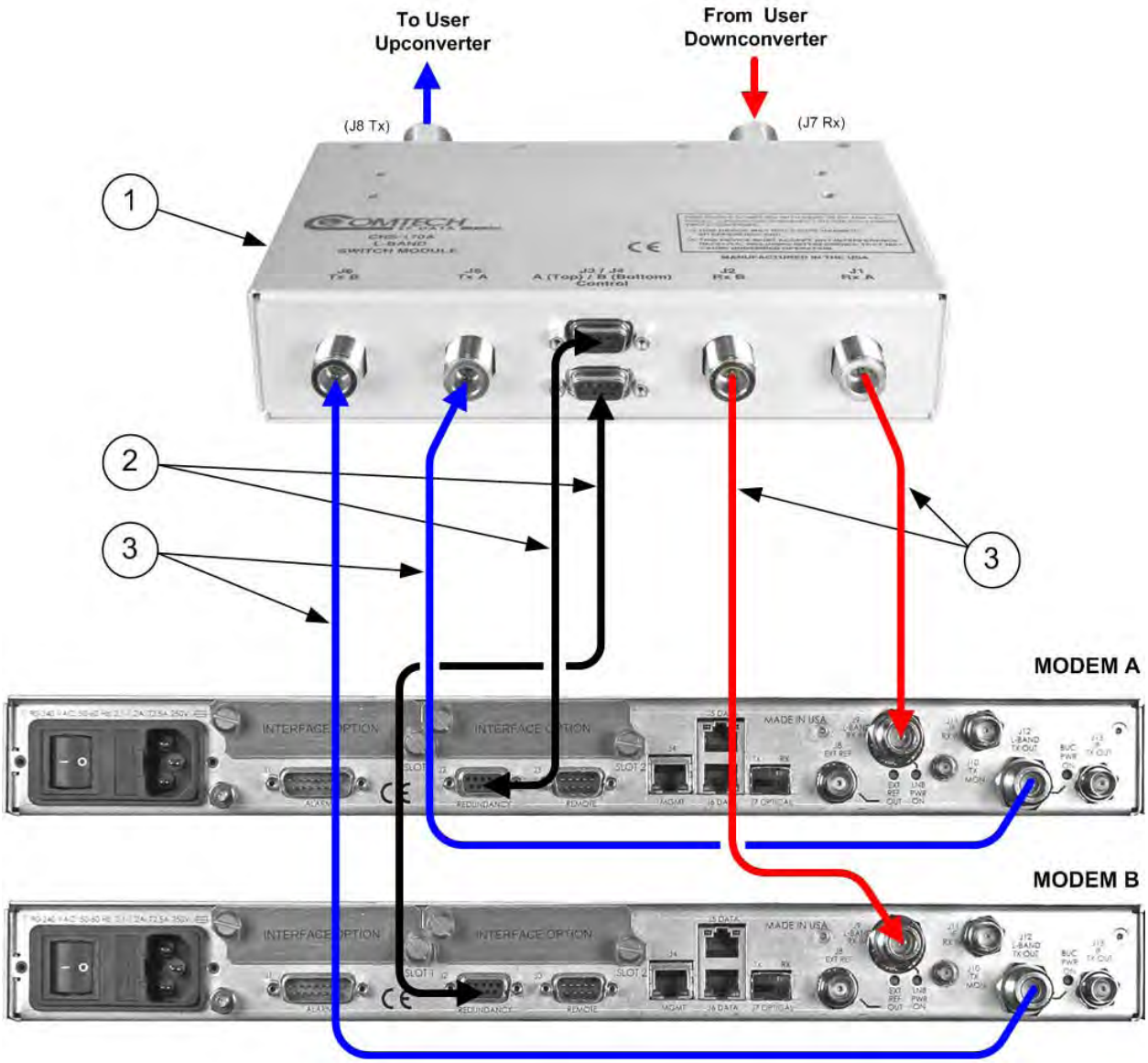
1. ***For information on the CDM-750 or CDM-760's 1:1 auto-enable functionality, see:***
   - **Chapter 3. MODEM AND SWITCH CONFIGURATION**
   - **CDM-750 Advanced High-Speed Trunking Modem Installation and Operation Manual (CEFD P/N MN-CDM750)**
   - **CDM-760 Advanced High-Speed Trunking Modem Installation and Operation Manual (CEFD P/N MN-CDM760)**

2. ***For information on the cables and cable assemblies specified in this section, see:***
   - **Appendix A. CABLE DRAWINGS**

4.4.1 Modem-to-Switch Control and IF Interface Connection

Terrestrial data interface components/kits must be ordered separately. See Sect. 4.3.2 for CDM-750/CDM-760 terrestrial data interface configuration and connection examples and details.

Figure 4-20 shows the control and IF connections for the modem to the CRS-170A Switch. All control and IF components are provided for the modem in the KT-0000160 CRS-170A L-Band 1:1 Redundancy Kit.



KT-0000160 1:1 Redundancy Control/IF Interface Cabling Kit (CRS-170A → CDM-750/CDM-760)			
Item	CEFD Part No.	Qty	Description
1	PL/10129-1	1	CRS-170A Switch – Top Assembly
2	CA/WR9378-4	2	Control Cable – Universal, DB-9M → DB-9M, 4’
3	CA/RF10453-4	4	RoHS-Compliant Cable – IF (Tx/Rx), 50Ω Type ‘N’, 4’

Figure 4-20. CDM-750/CDM-760 Modem-to-Switch Control & IF Connections Kit KT-0000160

4.4.2 Modem-to-User Data Interface Connections and Examples

In addition to the control and IF switch-to-modem cabling shown in the previous section, a number of data interface configuration kits are available for use with the CDM-750/CDM-760.

4.4.2.1 RJ-45 Gigabit Ethernet Data Interface Example

When no optional data interfaces are installed via the available J7 Optical port or Plug-In Interface Card (PIIC) slots, by default the CDM-750/CDM-760 provides a 10/100 Ethernet data interface via two copper RJ-45 Gigbabit Ethernet (also referred to as GigE or GbE) Interface ports. **Figure 4-21** shows a block diagram and cabling example of a CDM-750/CDM-760 1:1 modem configuration using these RJ-45 ports (this example depicts use of both ports). Direct connection is made with user-provided Ethernet cables and Layer 2 switches, so no cables or kit is required.

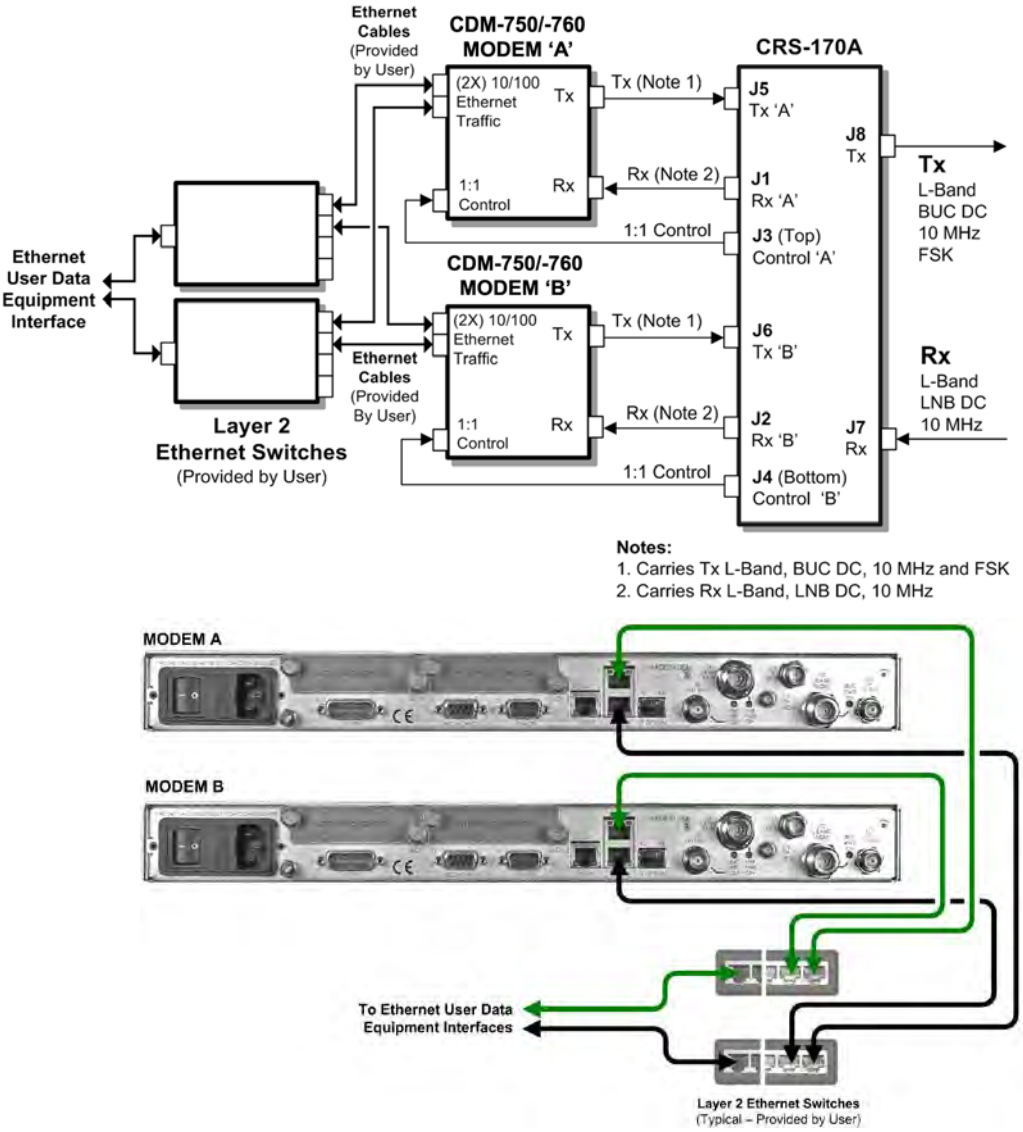
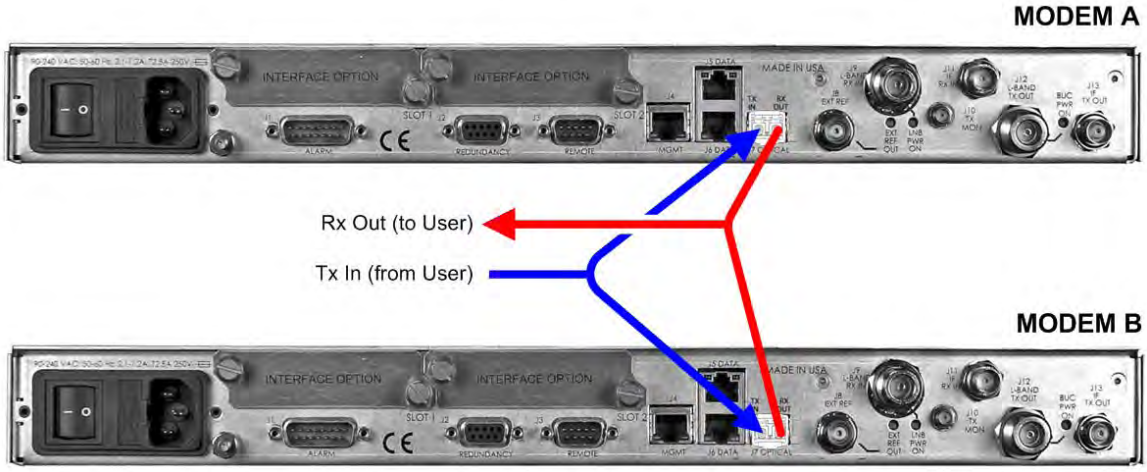


Figure 4-21. CDM-750/CDM-760 RJ-45 Gigabit Ethernet 1:1 Example

4.4.2.2 Optical Gigabit Ethernet Interface Option Example

Figure 4-22 depicts a CDM-750/CDM-760 1:1 modem configuration using the FAST-activated J7 Optical SFP port and optional Optical Gigabit Ethernet Interface module (CEFD P/N IC-0000058).

Depending on the mode – Single Mode or Multi Mode – installation involves use of either one CA-0000560 Optical Single-Mode Y-Cable set, or one CA-0000559 Multi-Mode Y-Cable set. Mode configuration is easily distinguished by the color of the cables; for *Single-Mode* configurations, **yellow** cabling is used by the CA-0000560 'Y' Cable, whereas a *Multi-Mode* configuration using the CA-0000559 'Y' Cable features **orange** cabling.



Type L C sockets, part o f optional I C-0000058 SFP Module, typical for Single-Mode or Multi-Mode Optical Gigabit Ethernet:

CEFD Part No.	Qty	Description
CA-0000560	1	'Y' Cable Assy – RoHS-Compliant, Single-Mode Optical, LC Connectors

-OR-

CEFD Part No.	Qty	Description
CA-0000559	1	Y' Cable Assy – RoHS-Compliant, Multi-Mode 'Optical, LC Connectors

Figure 4-22. CDM-750/CDM-760 Optical Gigabit Ethernet 1:1 Example

4.4.2.3 Serial Data Interface Kit and Connection Examples

For all CDM-750/CDM-760 serial data interface configurations, separate cabling kits are needed. For each user interface, one interface kit per 1:1 modem pair is required (see examples for specified quantities). For example, **Sect. 4.3.2.3.1** identifies the interface kit used for the G.703 PIIC data interface.

Figure 4-23 shows a block diagram typical for the kits shown in this section. Note that this cabling diagram is not applicable to the standard Gigabit Ethernet Data Interface configuration – as shown in **Sect. 4.3.2.1** and **Figure 4-22**, user-provided Ethernet cables and Layer 2 Switches are used.

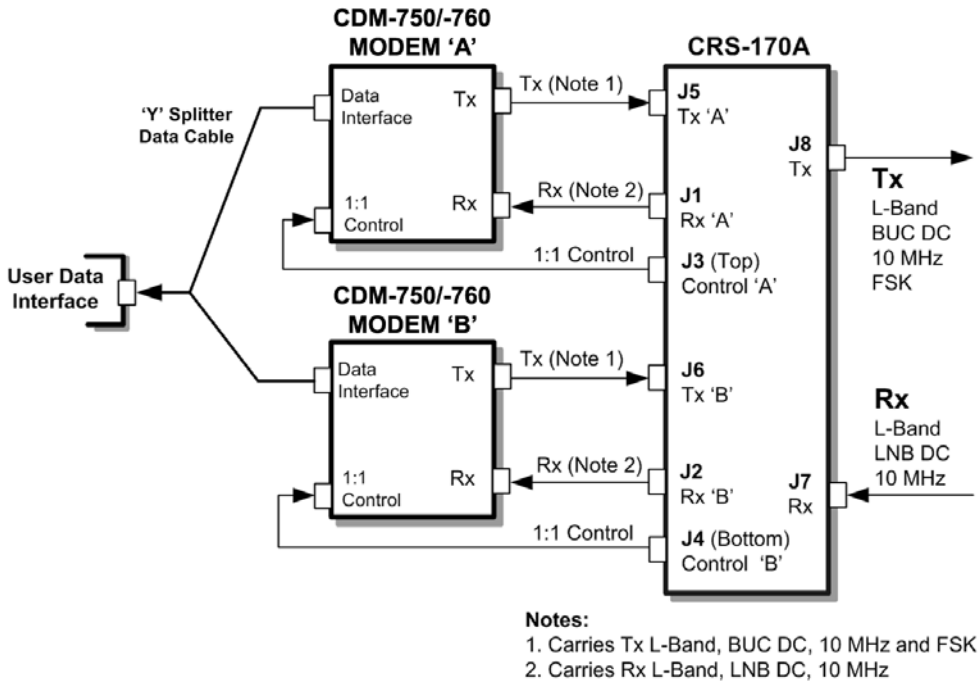


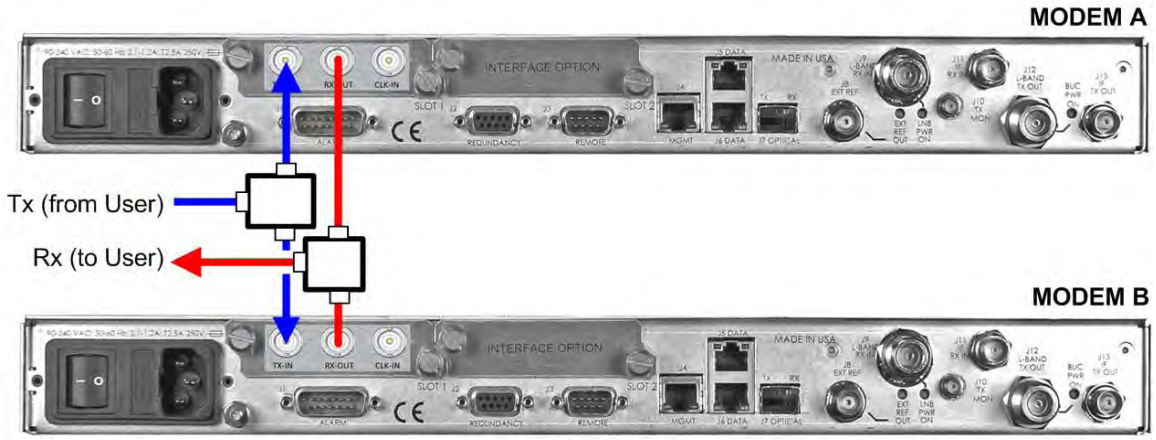
Figure 4-23. CDM-750/CDM-760 Block Diagram: User → Modem → Switch → Traffic

Note that, while data interface cards may be installed into both Interface Option slots, only one interface is operable at a given time.

The following table outlines the data interface operating combinations allowable in Interface Option slots 1 and 2 of the CDM-750/CDM-760 chassis:

Allowable CDM-750/CDM-760 Interface Operating Combinations	
PIIC Slot 1	PIIC Slot 2
G.703 E3/T3	None
None	G.703 E3/T3

4.4.2.3.1 KT/12542 G.703 75Ω Data Interface Kit (for Single G.703 E3/T3 PIIC)



KT/12542 G.703 75Ω Interface Cabling Kit (for Single G.703 E3/T3 PIIC)		
CEFD Part No.	Qty	Description
CA/BNC75OHM	4	Cable – IF, BNC 75Ω, 1’
RF/SA32KC-IN/OUT	2	Combiner – 2-Way w/Bracket, 0.25-300 MHz, BNC 75Ω

Figure 4-24. CDM-750/CDM-760 G.703 E3/T3 PIIC Interface Kit KT/12542

4.5 Cabling to the CDM-570L

1. ***For information on the CDM-570L's 1:1 auto-enable functionality, see:***
   - **Chapter 3. MODEM AND SWITCH CONFIGURATION**
   - **CDM-570/CDM-570L/CDMR-570L Satellite Modem Installation and Operation Manual (CEFD P/N MN/CDM570L.IOM)**

1. ***For information on the cables and cable assemblies specified in this section, see:***
   - **Appendix A. CABLE DRAWINGS**

4.5.1 CRS-170A → CDM-570 1:1 Redundancy Kit KT/10860-1

Reference to how the items provided in Redundancy Kit KT/10860-1 are used with all possible CDM-570L data interface configurations is as follows:

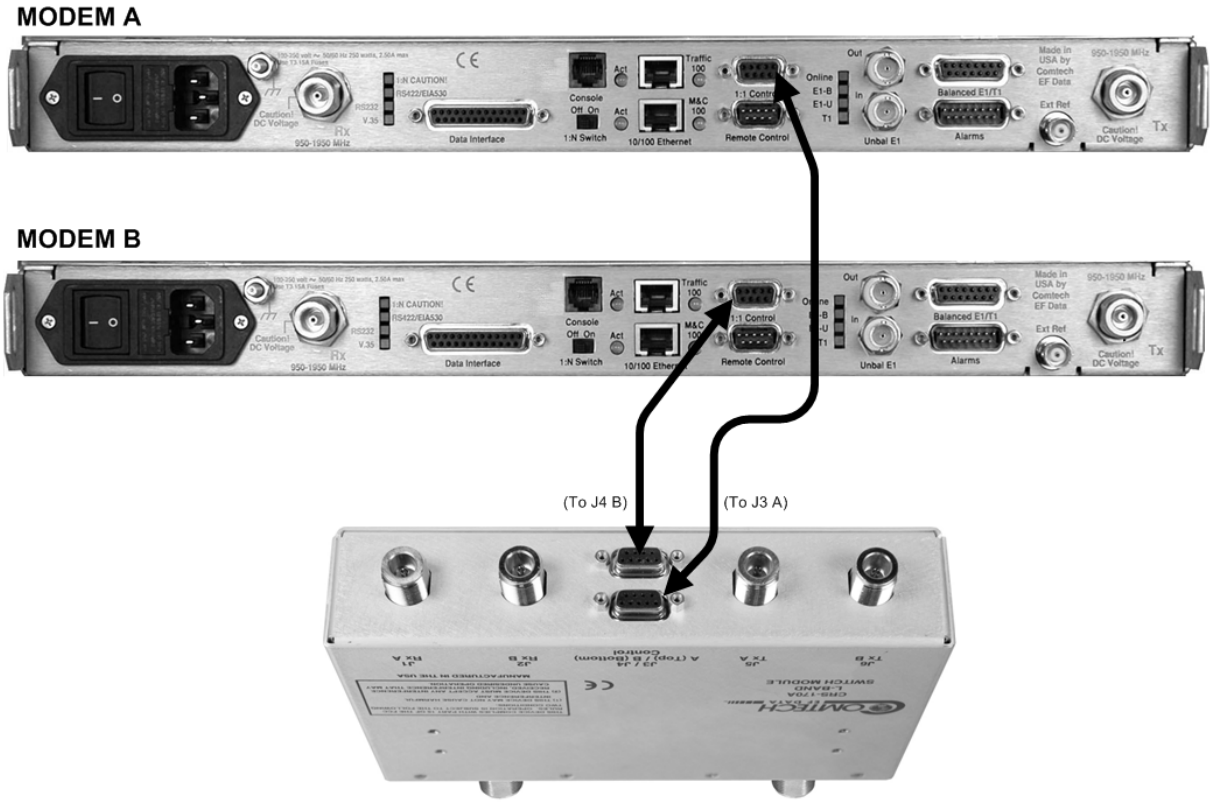
KT/10860-1 1:1 Redundancy Kit – Interface Cabling Reference (CRS-170A → CDM-570L)				
CEFD Part No.	Qty/Kit (REF)	Description	Used For	Ch. 4 Fig
PL/10129-1	1	CRS-170A Switch – Top Assembly	1:1 Redundancy	4-20 4-21
CA/WR9378-4	2	Control Cable – Universal, DB-9M → DB-9M, 4'	Modem → Switch Control	4-20
CA/RF10453-4	4	RoHS-Compliant Cable – IF (Tx/Rx), 50Ω Type 'N', 4'	Modem → Switch IF Interface	4-21
CA/RB10461-1	1	Cable – 1:1 Y-Splitter, (2X) DB-25M → DB-25F	EIA-422/232 Interface	4-23
CA/WR10522-1	1	Cable – 1:1 Y-Splitter, (2X) DB-15M → DB-15F	G.703 Balanced	4-24
KT/10553-1	1	G.703 Unbalanced Interface Kit containing: (Qty 4) CA/BNC75OHM Cable – IF BNC, 1' (Qty 2) CN/BNC-Tee-JPJ T-Adapter, 50Ω BNC	G.703 Unbalanced	4-25

Figure 4-25 and **Figure 4-26** show how to connect a pair of CDM-570L modems together with the CRS-170A L-Band 1:1 Redundancy Switch module; the table for each figure lists the cable assemblies provided in KT/10860-1 for this initial setup.

It is essential to ensure that the control and IF connections, both Rx and Tx, are made correctly. See **Sect. 4.4.2** in this chapter for details of the CDM-570L Modem-to-Switch Control Interface connection; **Sect. 4.4.3** for details of the CDM-570L Modem-to-Switch IF Interface connection; and **Sect. 4.4.4** for details of the CDM-570L data interface configurations.

4.5.2 Modem-to-Switch Control Interface Connection

When connecting the Control cable between the CRS-170A and the modems, ensure that screw locks on the 'D' type connectors are securely fastened. This will prevent the accidental unmating of the cable, particularly when a standby unit is being removed or replaced.



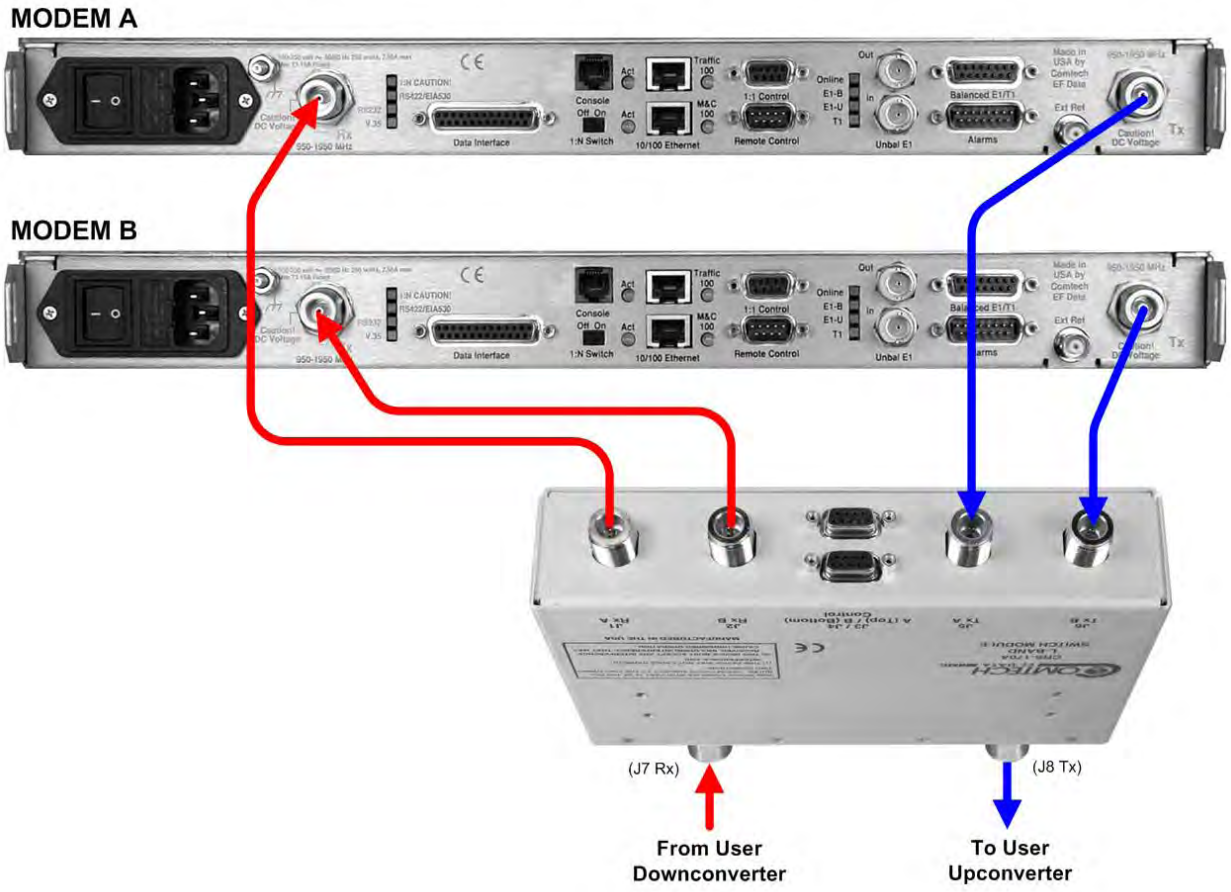
CEFD Part No.	Qty	Description
CA/WR9378-4	2	Control Cable – Universal, DB-9M, 4'

Figure 4-25. CDM-570L Modem-to-Switch Control Connections

4.5.3 Modem-to-Switch IF Interface Connection

EXAMPLE: ***The Tx IF from ' Modem A' connects to the Tx IF port 'J5 Tx A' on the CRS-170A; similarly, the Tx IF from 'Modem B' connects to the Tx IF port 'J6 Tx B' on the CRS-170A.***

The same logic applies for the Rx IF connections. It is important to note that failure to observe this requirement will result in system malfunction.



CEFD Part No.	Qty	Description
CA/RF10453-4	4	RoHS-Compliant Cable – IF (Tx/Rx), 50Ω Type 'N', 4'

Figure 4-26. CDM-570L Modem-to-Switch L-Band IF Connections

4.5.4 Modem-to-User Data Interface Connections and Examples

In addition to the control and IF switch-to-modem cabling shown previously, a number of data interface configurations are available for the CDM-570L. The block diagram shown in **Figure 4-27** is typical for the examples shown in **Sects. 4.4.4.1** through **4.4.4.3**.

With the exception of the 10/100 Ethernet Interface configuration shown in **Sect. 4.4.4.4,** where user-provided Ethernet cables and hub are used, one cable/component set per 1:1 modem pair is required for each user interface (see examples for specified quantities).

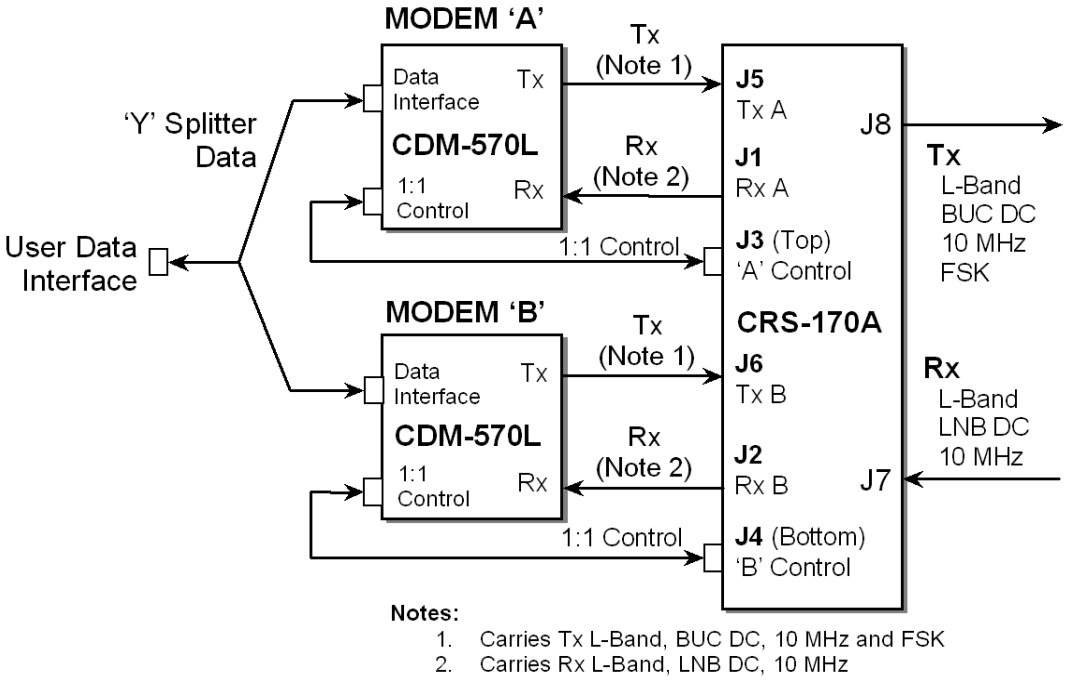
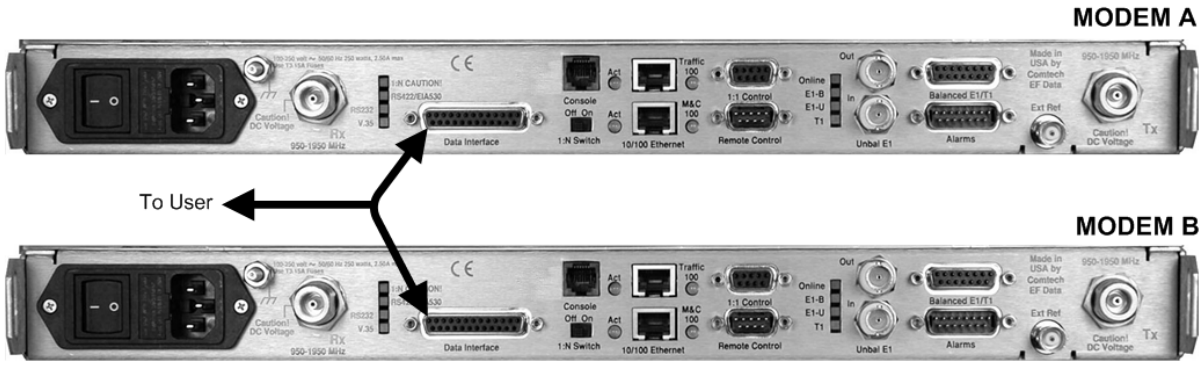


Figure 4-27. CDM-570L Block Diagram: User → Modem → Switch → Traffic

Unless otherwise specified, the interface cables and components identified in each of the examples that follow are provided in the KT/10860-1 CDM-570L 1:1 Redundancy Kit (see Sect. 4.4.1).

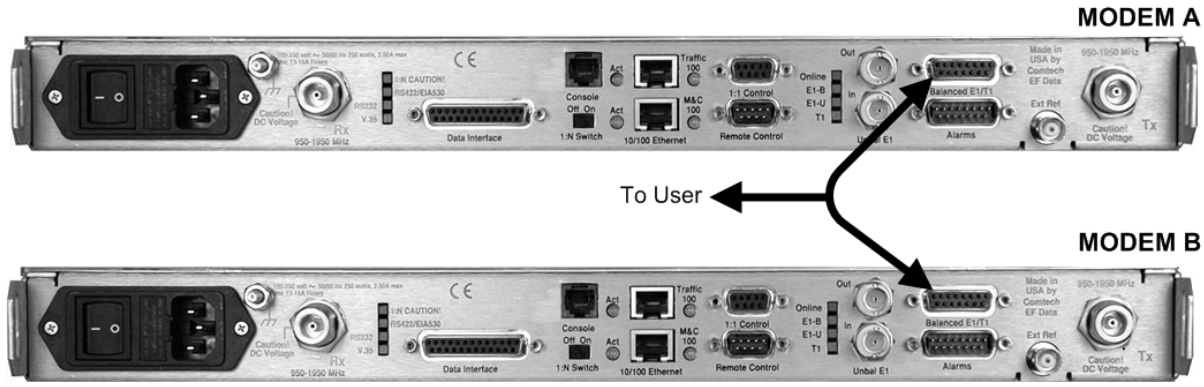
4.5.4.1 EIA-422/232 Interface Example



CEFD Part No.	Qty	Description
CA/RB10461-1	1	Cable – 1:1 'Y' Splitter, (2X) DB-25M → DB-25F

Figure 4-28. CDM-570L EIA-422/232 1:1 Example

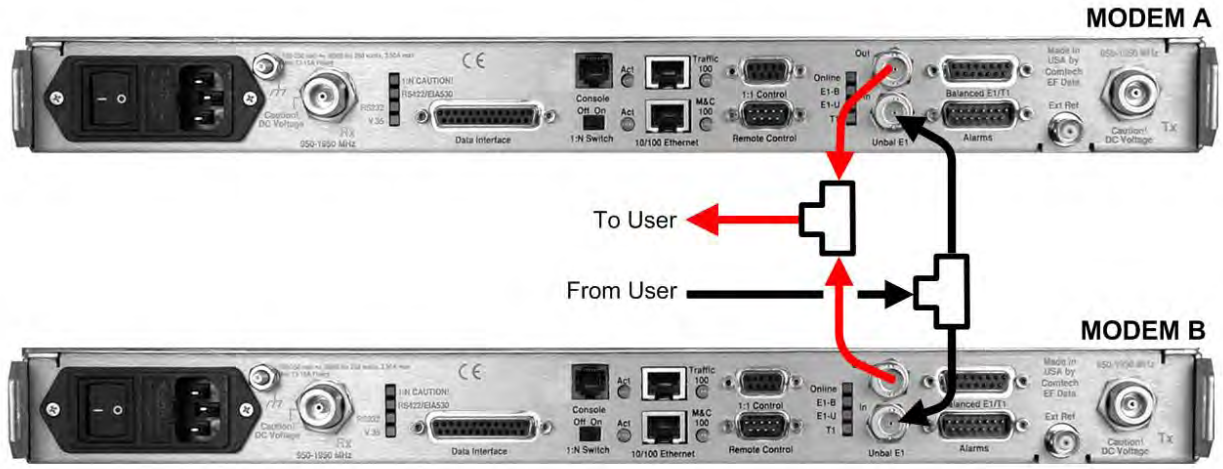
4.5.4.2 G.703 Balanced Interface Example



CEFD Part No.	Qty	Description
CA/WR10522-1	1	Cable – 1:1 'Y' Splitter, (2X) DB-15M → DB-15F

Figure 4-29. CDM-570L G.703 Balanced 1:1 Example

4.5.4.3 G.703 Unbalanced Interface Example



G.703 Unbalanced 1:1 Interface Kit KT/10553-1		
CEFD Part No.	Qty	Description
CA/BNC75OHM	4	Cable – IF BNC, 1’
CN/BNC-TEE-JPJ	2	T-Adapter, 50Ω BNC

Figure 4-30. CDM-570L G.703 Unbalanced 1:1 Example

4.5.4.4 10/100 Ethernet Interface Example

Figure 4-31 shows a block diagram and cabling example of a CDM-570L 1:1 modem configuration using the 10/100 Ethernet Interface. User-provided Ethernet cables are connected directly to the ports, so no cables or kit is required.

For the CDM-570L in Managed Switch (Ethernet Bridge) Mode, you MUST use an external Ethernet hub to insure that traffic will continue after a switchover. If an Ethernet switch is used, there could be a several minute outage while the Ethernet Switch "re-learns" the correct output Ethernet port. Using a "dumb" Ethernet hub allows LAN to WAN traffic to continue even after a switchover occurs since both modems will be receiving the LAN traffic.

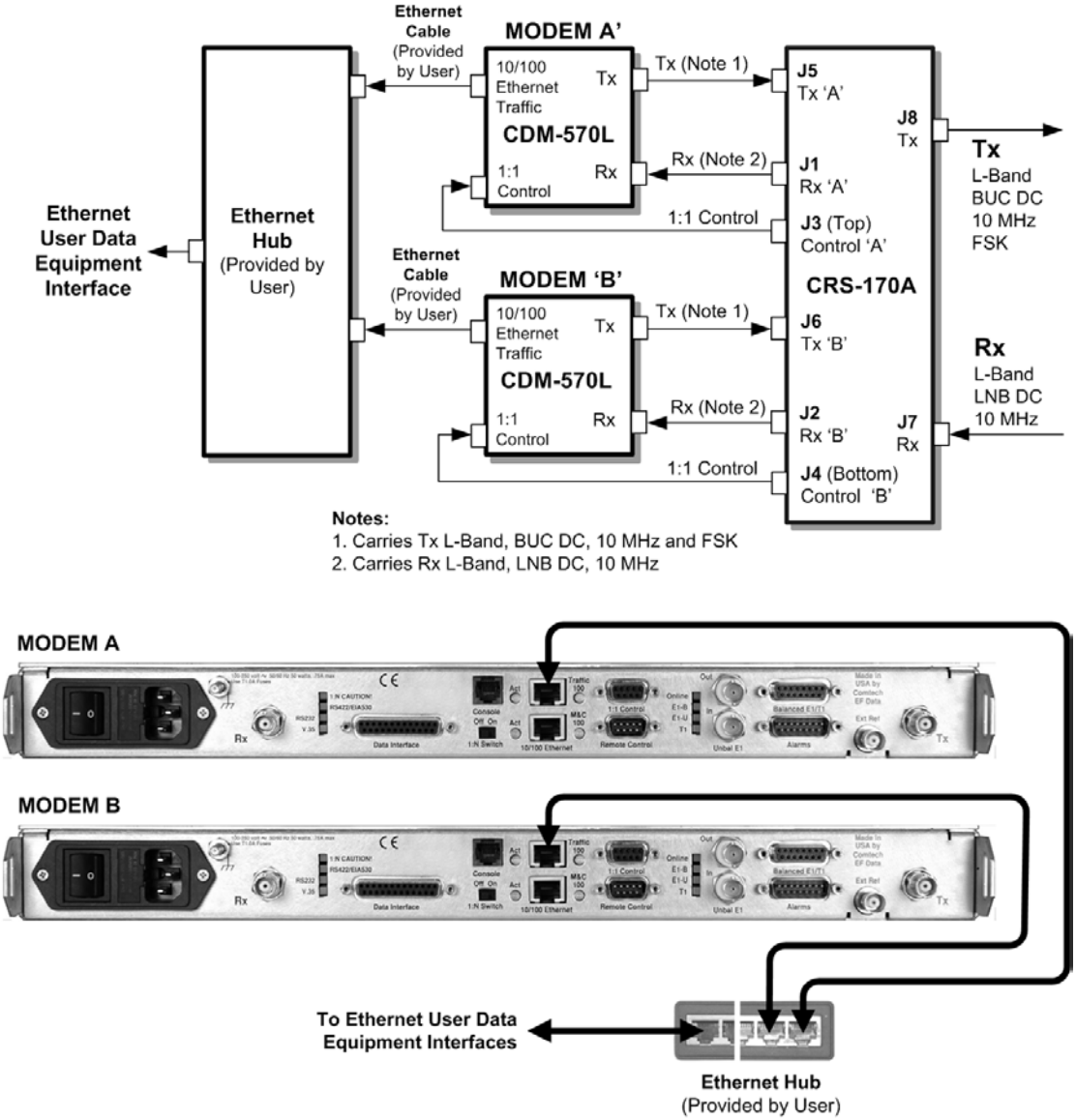


Figure 4-31. CDM-570L 10/100 Ethernet 1:1 Example

Notes:

4.6 Cabling to the CDM-700

1. ***For information on configuring the CRS-170A L-Band 1:1 Redundancy Switch and CDM-700 Satellite Modems for 1:1 operation, see:***
   - **Chapter 3. MODEM AND SWITCH CONFIGURATION**
   - **CDM-700 Satellite Modem Installation and Operation Manual (CEFD P/N MN/CDM700.IOM)**

2. ***For information on the cables and cable assemblies specified in this section, see:***
   - **Appendix A. CABLE DRAWINGS**

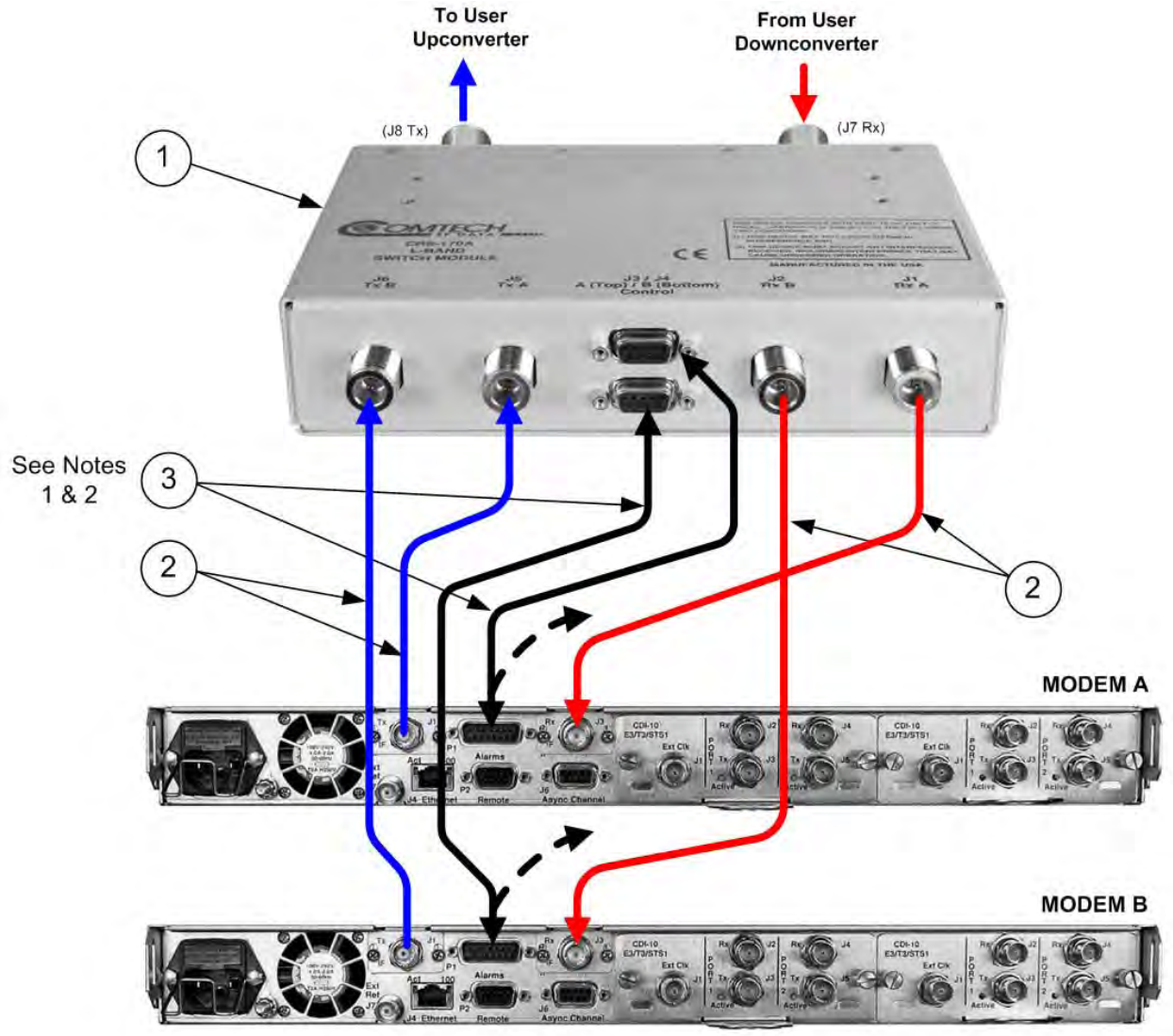
4.6.1 Modem-to-Switch Control and IF Interface Connection

Appendix A. CABLE DRAWINGS

Figure 4-32 shows the control and IF connections for the CDM-700 to the CRS-170A. All control and IF components are provided in the KT/12551 CRS-170A L-Band 1:1 Redundancy Kit (terrestrial data interface components/kits must be ordered separately). **Note the following:**

1. To provide user access to modem "Fault Summary Relay," Control 'Y' Cable CA/WR13011-4, sold separately, is available for use in place of the CA/WR12135-1 cable.

2. Control Cable CA/WR12135-1 will mute the Offline modem's Tx IF. If this is not desired, then an alternate cable, Control Cable CA-0000187, sold separately, is available for use in place of the CA/WR12135-1 cable.



KT/12551 CRS-170A L-Band 1:1 Redundancy Kit			
Item	CEFD Part No.	Qty	Description
1	PL/10129-1	1	CRS-170A Switch – Top Assembly
2	CA/RF10453-4	4	Cable – RoHS-Compliant, L-Band Type 'N', 4'
3	CA/WR12135-1 (Notes 1, 2)	2	Cable Assy – RoHS-Compliant, Control Adapter

Figure 4-32. CDM-700 Modem-to-Switch Control & IF Connections – KT/12551

4.6.2 Modem-to-User Data Interface Kit and Connection Examples

In addition to the control and IF switch-to-modem cabling shown in the previous section, a number of data interface configurations are available for use with the CDM-700. The kits featured in this section can be supplied with the CRS-170A for use with the CDM-700.

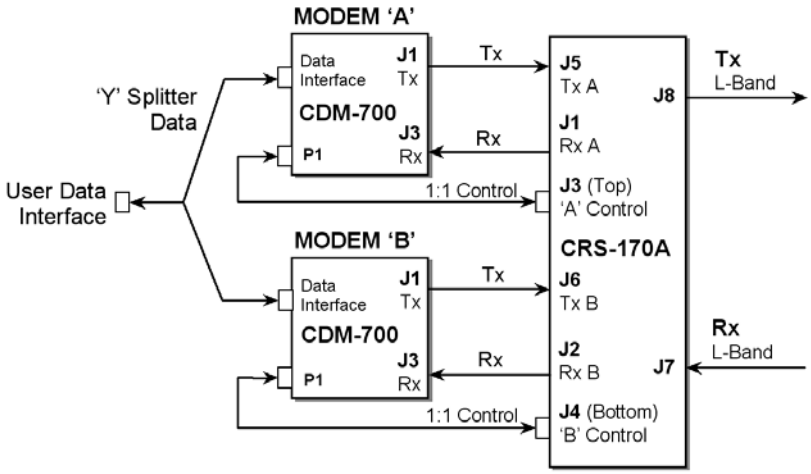


Figure 4-33. CDM-700 Block Diagram: User → Modem → Switch → Traffic

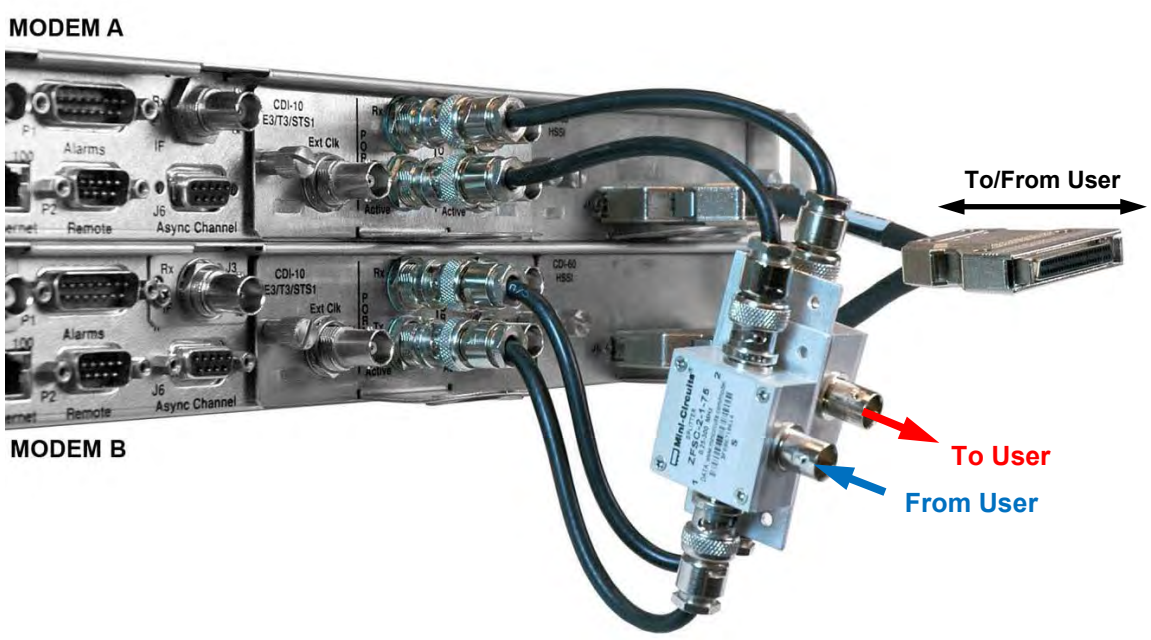
Figure 4-33 shows a block diagram typical for the kits shown in **Sects. 4.5.2.1** through **4.5.2.3. Separate interface cabling kits are needed for these CDM-700 data interfaces.** For example, **Sect. 4.5.2.1** identifies the interface kits used for the CDI-10 Dual G.703 E3/T3/STS-1 and the CDI-60 HSSI Data Interfaces. With the exception of the CDI-70 Gigabit Ethernet Data Interface configuration shown in **Sect. 4.5.2.4,** where user-provided Ethernet cables and Layer 2 Switch are used, one interface kit per 1:1 modem pair is required for each user interface (see examples for specified quantities).

The data interface combinations allowable in Interface Slots 1 and 2 of the CDM-700 chassis are as follows:

Allowable CDM-700 Combinations	
Interface Slot 1	Interface Slot 2
Dual G.703 (CDI-10)	None
	Dual G.703 (CDI-10)
	HSSI (CDI-60)
	GigE (CDI-70)
OC3 Optical (CDI-50-1) Single Mode	None
OC3 Copper (CDI-50-1)	None
HSSI (CDI-60)	None
	HSSI (CDI-60
	GigE (CDI-70)
GigE (CDI-70)	None
	GigE (CDI-70)
None	Dual G.703 (CDI-10)
	HSSI (CDI-60)
	GigE (CDI-70)

4.6.2.1 Dual G.703 E3/T3/STS-1 75Ω Data Interface (CDI-10) Kit KT/12582 and HSSI Data Interface (CDI-60) Kit KT/12586

Figure 4-34 shows an example of a CDM-700 1:1 modem configuration with the CDI-10 Dual G.703 Data Interface installed in Slot 1, and the CDI-60 HSSI Data Interface installed in Slot 2. The figure depicts installation of one KT/12582 Dual G.703 Interface Kit (each kit can supply one or two CDI-10 interfaces), and one KT/12586 HSSI Interface Kit.



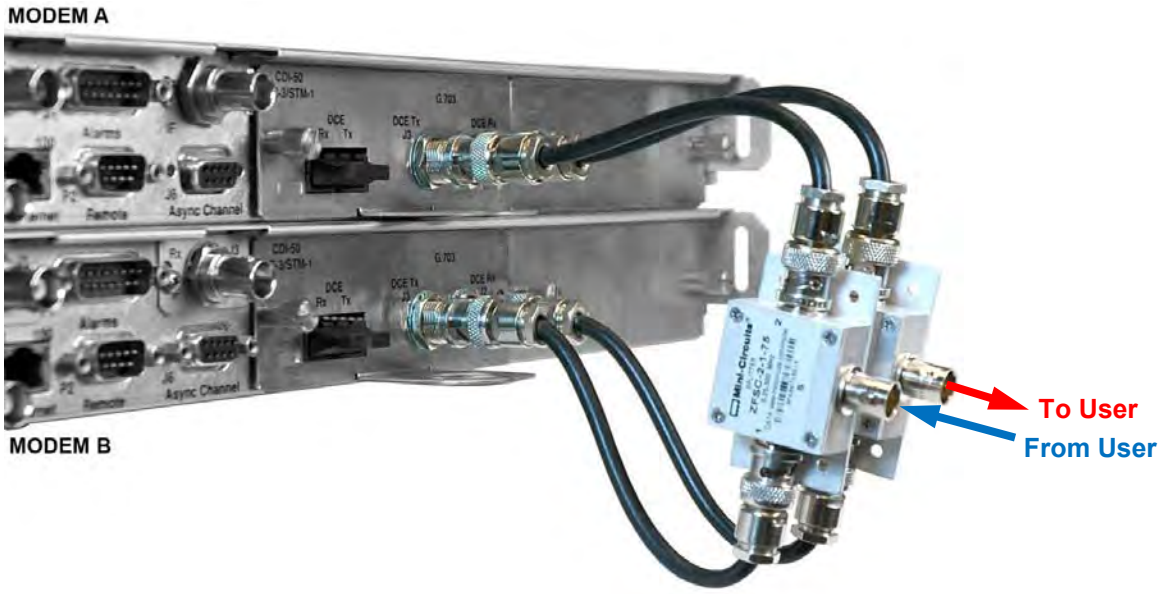
KT/12582 G.703 (CDI-10) 75Ω Interface Kit		
CEFD Part No.	Qty	Description
CA/BNC75OHM	8	Cable – IF BNC, 75Ω, 1’
RF/SA32KC-IN/OUT	4	Combiner – 2-way w/Bracket, 0.25-300 MHz, 75Ω BNC

KT/12586 HSSI (CDI-60) Interface Kit		
CEFD Part No.	Qty	Description
PP/SC3523	1	Cable - RoHS-Compliant, HSSI ‘Y’ Splitter, (2X) HD-50M → HD-50F, 3”

Figure 4-34. CDM-700 G.703 E3/T3/STS-1 / HSSI 1:1 Example

4.6.2.2 155MB Copper Data Interface (CDI-50) Kit KT/12583

Figure 4-35 shows an example of a CDM-700 1:1 modem configuration with a CDI-50 Data Interface installed in Slot 1 for use with 155MB Copper data, and Slot 2 empty. The figure depicts installation of one KT/12583 155MB Copper Interface Kit – each kit can supply one or two CDI-50 interfaces.



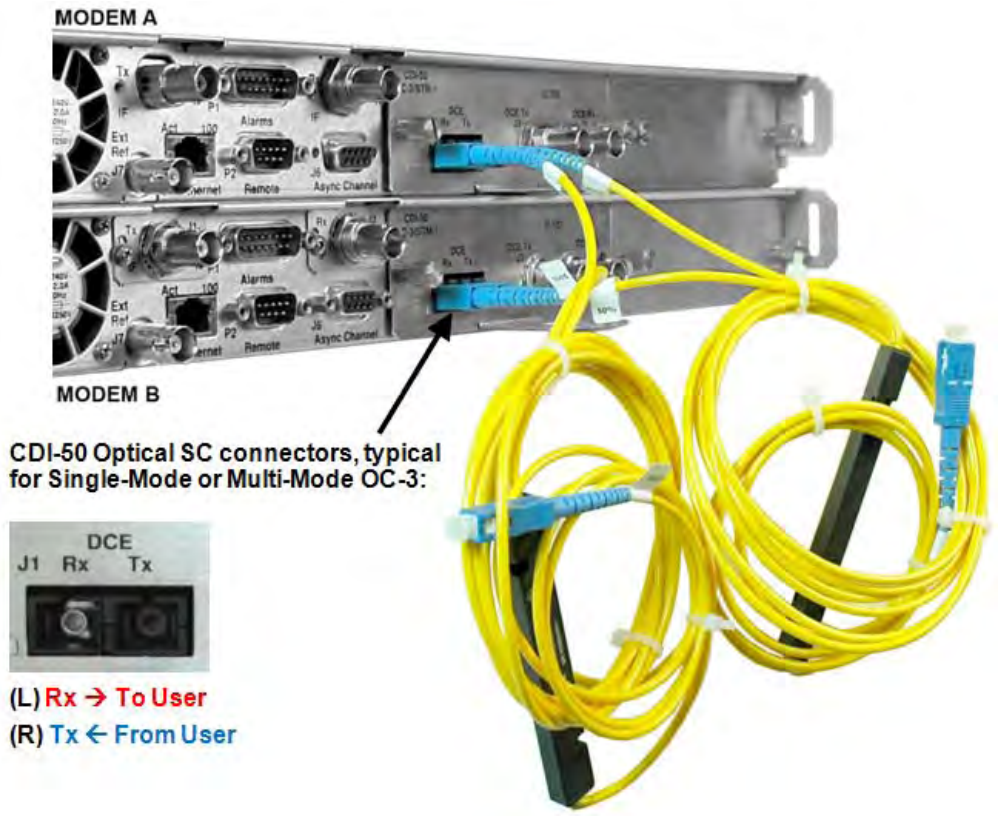
KT/12583 155MB Copper (CDI-50) Interface Kit		
CEFD Part No.	Qty	Description
CA/BNC75OHM	4	Cable – IF BNC, 75Ω, 1’
RF/SA32KC-IN/OUT	2	Combiner – 2-way w/Bracket, 0.25-300 MHz, 75Ω BNC

Figure 4-35. CDM-700 155MB Copper 1:1 Example

4.6.2.3 OC-3 Data Interface (CDI-50) Kits KT/12585 (Single-Mode) or KT/12584 (Multi-Mode)

Figure 4-36 depicts a CDM-700 1:1 modem configuration with installation of one CDI-50 Data Interface installed in Slot 1 for use with OC-3 data, and Slot 2 empty. The figure depicts installation of one KT/12585 OC-3 Single-Mode Interface Kit. Multi-Mode configurations use the KT/12584 OC-3 Multi-Mode Interface kit.

Mode configuration is easily distinguished by the color of the cables included in the kit; for Single-Mode configurations, **yellow** cabling is used as shown in **Figure 4-36**, whereas a Multi-Mode configuration (not shown) features **orange** cabling.



KT/12585 OC-3 Single-Mode (CDI-50) Interface Kit		
CEFD Part No.	Qty	Description
PP/CPS2A12501	2	Cable Assy – RoHS-Compliant, Optical Coupler, SC/UPC Connectors

OR

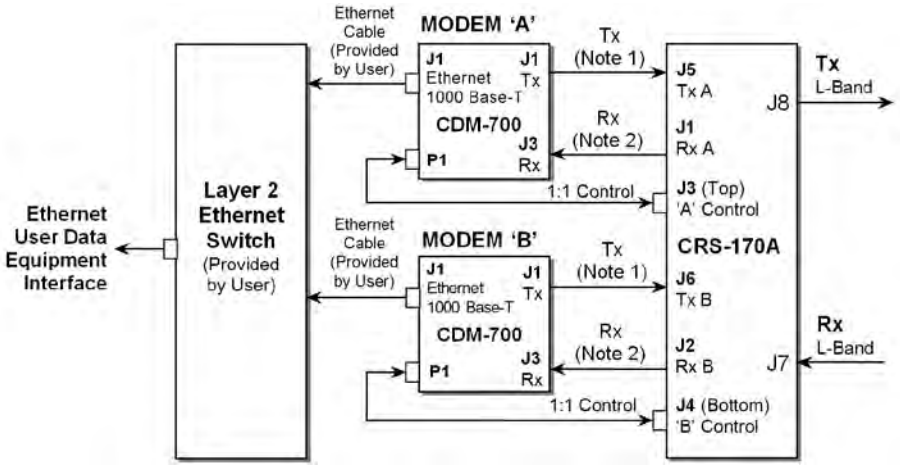
KT/12584 OC-3 Multi-Mode (CDI-50) Interface Kit		
CEFD Part No.	Qty	Description
PP/CPM6A1250	2	Cable Assy – RoHS-Compliant, Optical Coupler, SC/UPC Connectors

Figure 4-36. CDM-700 OC-3 1:1 Example (Single-Mode shown)

4.6.2.4 Gigabit Ethernet Data Interface (CDI-70) Example

See CEFD White Paper "Bridged Ethernet Interface Redundancy" available for download from Comtech EF Data's Web site (www.comtechefdata.com).

Figure 4-37 shows an example of a CDM-700 1:1 modem configuration with a CDI-70 Gigabit Ethernet Data Interface installed in Slot 1, and Slot 2 empty. User-provided Ethernet cables are connected directly to the interface, so no kit is required.



CDM-700 Block Diagram: Gigabit Ethernet (GigE) Interface

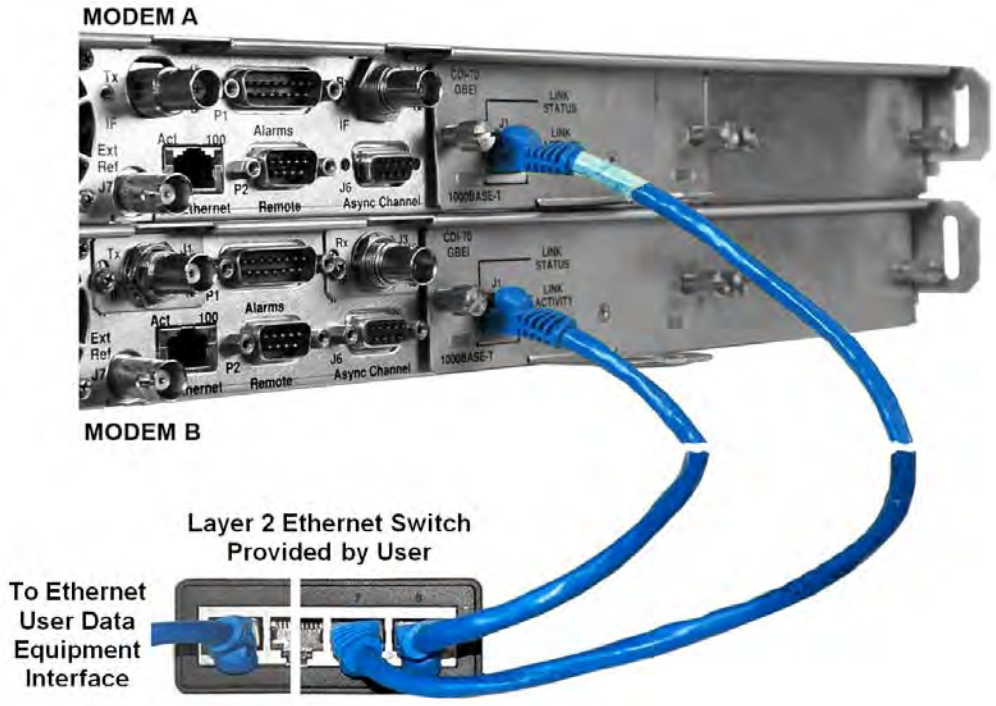


Figure 4-37. CDM-700 Gigabit Ethernet (GigE) 1:1 Example

Notes:

4.7 Cabling to the CDM-710

1. ***For information on configuring the CRS-170A L-Band 1:1 Redundancy Switch with the CDM-710 Broadcast Satellite Modems for 1:1 operation, see:***
   - **Chapter 3. MODEM AND SWITCH CONFIGURATION**
   - **CDM-710 Broadcast Satellite Modem Installation and Operation Manual (CEFD P/N MN/CDM710.IOM)**

2. ***For information on the cables and cable assemblies specified in this section, see:***
   - **Appendix A. CABLE DRAWINGS**

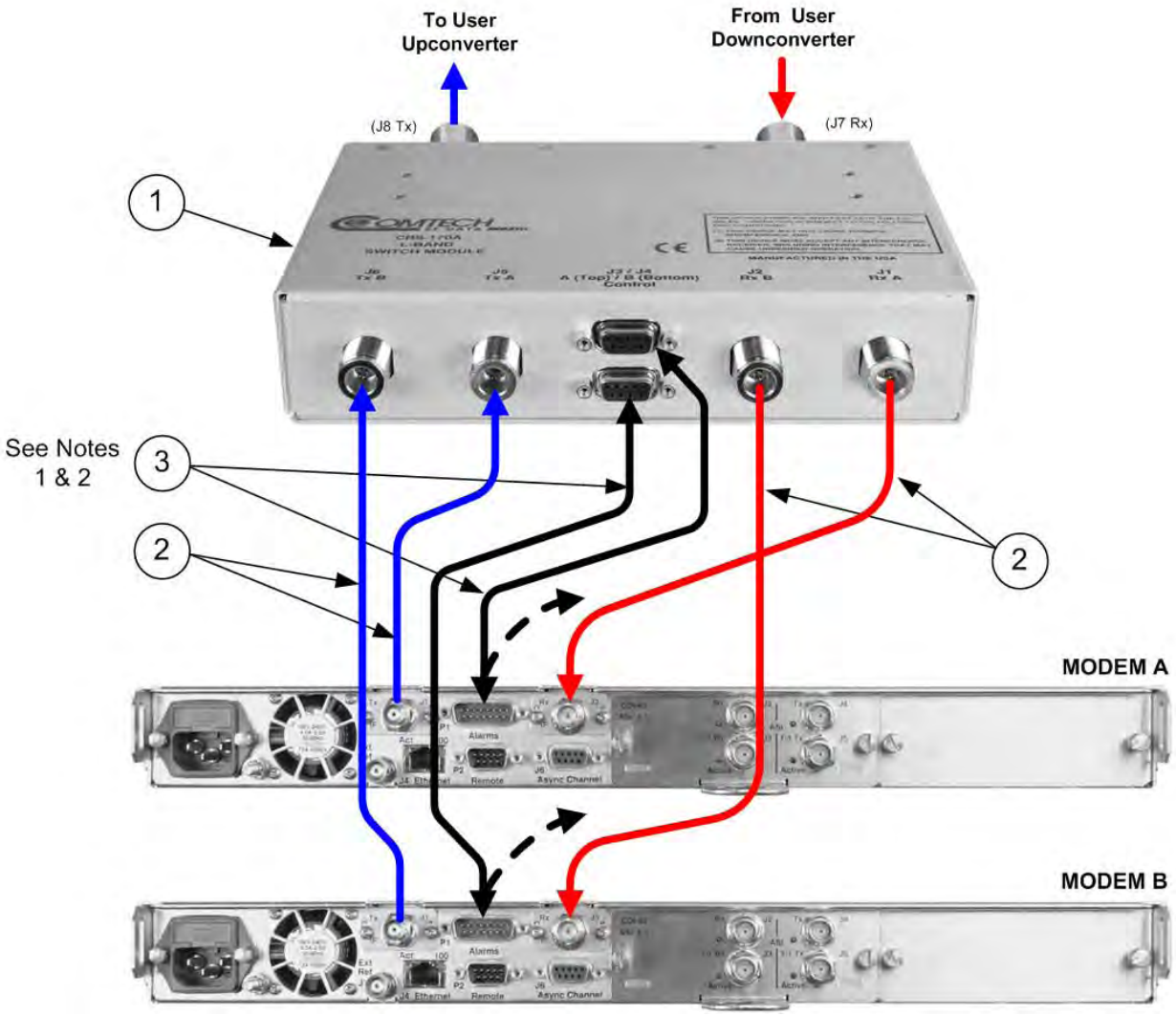
4.7.1 Modem-to-Switch Control and IF Interface Connection

Appendix A. CABLE DRAWINGS

Figure 4-38 shows the control and IF connections for the CDM-710 to the CRS-170A. All IF and control components are provided in the KT/12551 CRS-170A L-Band 1:1 Redundancy Kit (terrestrial data interface components/kits must be ordered separately). **Note the following:**

1. To provide user access to modem "Fault Summary Relay," Control 'Y' Cable CA/WR13011-4, sold separately, is available for use in place of the CA/WR12135-1 cable.

2. Control Cable CA/WR12135-1 will mute the Offline modem's Tx IF. If this is not desired, then an alternate cable, Control Cable CA-0000187, sold separately, is available for use in place of the CA/WR12135-1 cable.



KT/12551 CRS-170A L-Band 1:1 Redundancy Kit			
Item	CEFD Part No.	Qty	Description
1	PL/10129-1	1	CRS-170A Switch – Top Assembly
2	CA/RF10453-4	4	Cable – RoHS-Compliant, L-Band Type 'N', 4'
3	CA/WR12135-1 (Notes 1, 2)	2	Cable Assy – RoHS-Compliant, Control Adapter

Figure 4-38. CDM-710 Modem-to-Switch Control & IF Connections – KT/12551

4.7.2 Modem-to-User Data Interface Kit and Connection Examples

In addition to the control and IF switch-to-modem cabling shown in the previous section, a number of data interface configuration kits are available for use with the CDM-710.

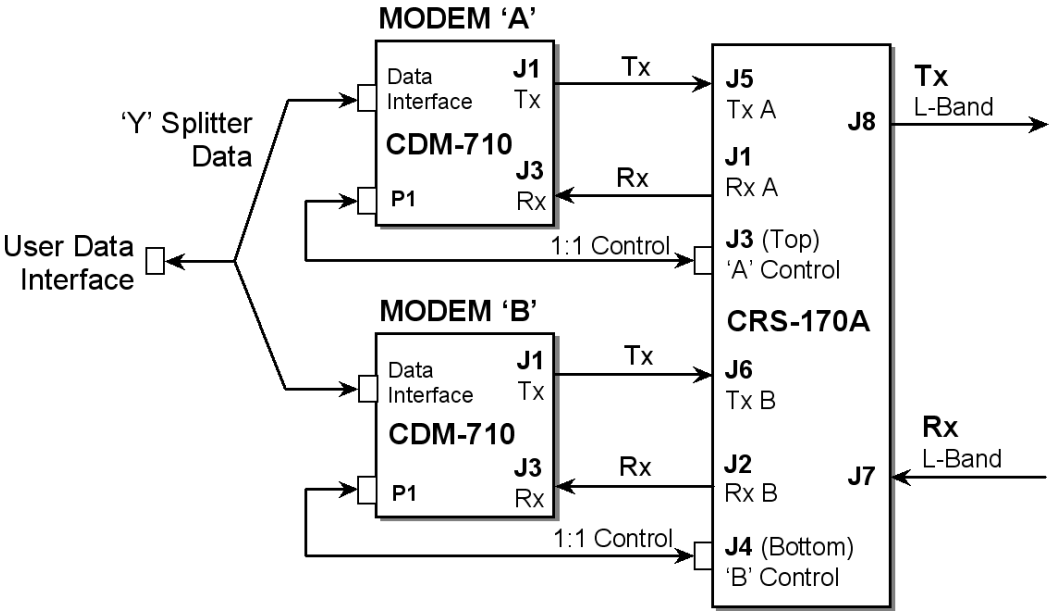


Figure 4-39. CDM-710 Block Diagram: User → Modem → Switch → Traffic

Figure 4-39 shows a block diagram typical for the kits shown in **Sects. 4.6.2.1** and **4.6.2.2**. **Separate cabling kits are needed for these CDM-710 data interfaces.** For example, **Sect. 4.6.2.1** identifies the interface kit used for the CDI-40 ASI Data Interface. With the exception of the CDI-70 Gigabit Ethernet Data Interface configuration shown in **Sect. 4.6.2.3**, where user-provided Ethernet cables and Layer 2 Switch are used, one interface kit per 1:1 modem pair is required for each user interface (see examples for specified quantities).

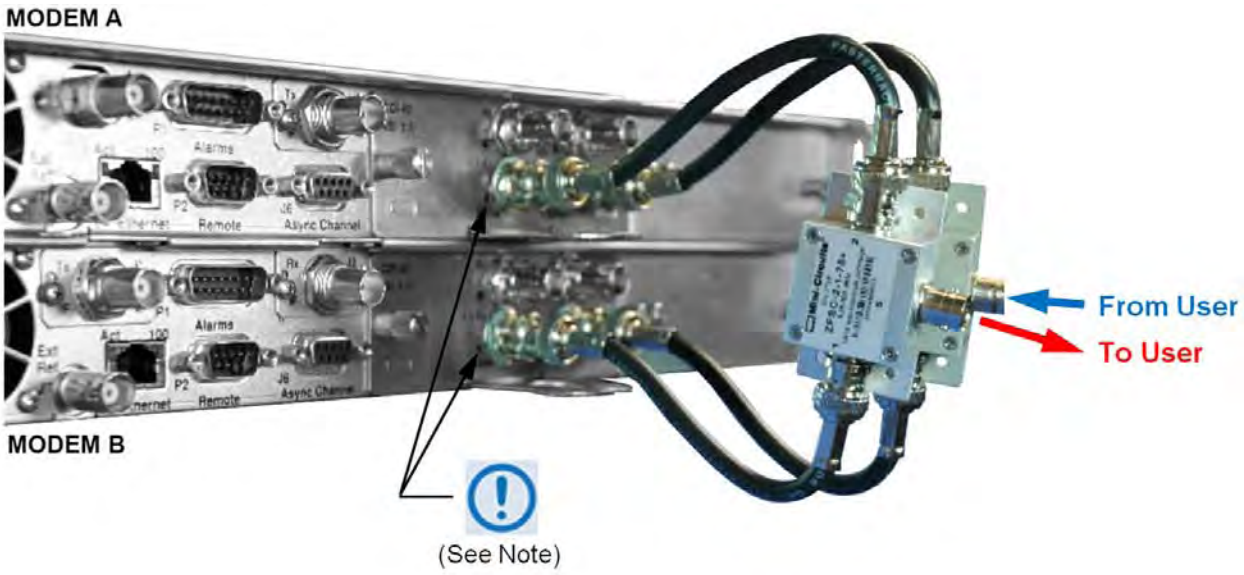
The data interface combinations allowable in Interface Slots 1 and 2 of the CDM-710 chassis are as follows:

Allowable CDM-710 Combinations	
Interface Slot 1	Interface Slot 2
ASI (CDI-40)	None
HSSI (CDI-60)	None
None	GbE (CDI-70)

4.7.2.1 ASI 75Ω Data Interface (CDI-40) Kit KT/12579

Figure 4-40 shows an example of a CDM-710 1:1 modem configuration with the CDI-40 ASI Data Interface installed in Slot 1, and Slot 2 empty. The figure depicts installation of one KT/12579 ASI Interface Kit.

Be sure to connect to the lower BNC connectors labeled "1:1" on the CDI-40 ASI Data Interface. The Rx port on each interface has been tuned to be 3 dB higher amplitude to compensate for the presence of the RF/SA32KC-IN/OUT 2-way combiner.

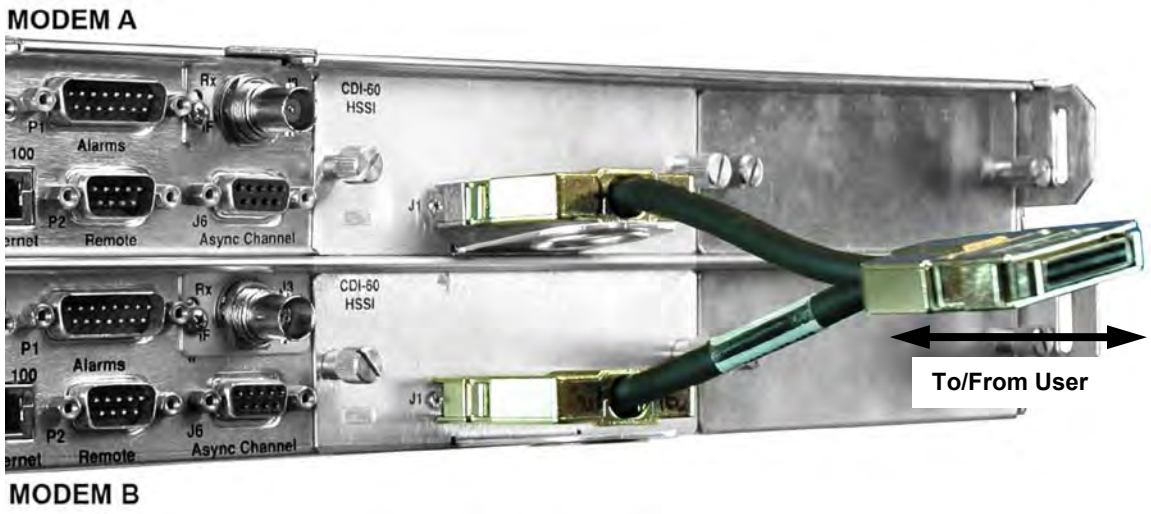


KT/12579 ASI (CDI-40) 75Ω Interface Kit		
CEFD Part No.	Qty	Description
CA/BNC75OHM	4	Cable – IF BNC, 75Ω, 1'
RF/SA32KC-IN/OUT	2	Combiner – 2-way w/Bracket, 0.25-300 MHz, 75Ω BNC

Figure 4-40. CDM-710 ASI 1:1 Example

4.7.2.2 HSSI Data Interface (CDI-60) Interface Kit KT/12586

Figure 4-41 shows an example of a CDM-710 1:1 modem configuration with the CDI-60 HSSI Data Interface installed in Slot 1, and Slot 2 empty. The figure depicts installation of one KT/12586 HSSI Interface Kit.



KT/12586 HSSI (CDI-60) Interface Kit		
CEFD Part No.	Qty	Description
PP/SC3523	1	Cable - RoHS-Compliant, HSSI 'Y' Splitter, (2X) HD-50M → HD-50F, 3"

Figure 4-41. CDM-710 HSSI 1:1 Example

4.7.2.3 Gigabit Ethernet Data Interface (CDI-70) Example

See CEFD White Paper "Bridged Ethernet Interface Redundancy" available for download from Comtech EF Data's Web site (www.comtechefdata.com).

Figure 4-42 shows a block diagram and cabling example of a CDM-710 1:1 modem configuration with a CDI-70 Gigabit Ethernet Data Interface in Slot 2, and Slot 1 empty. User-provided Ethernet cables are connected directly to the interface, so no kit is required.

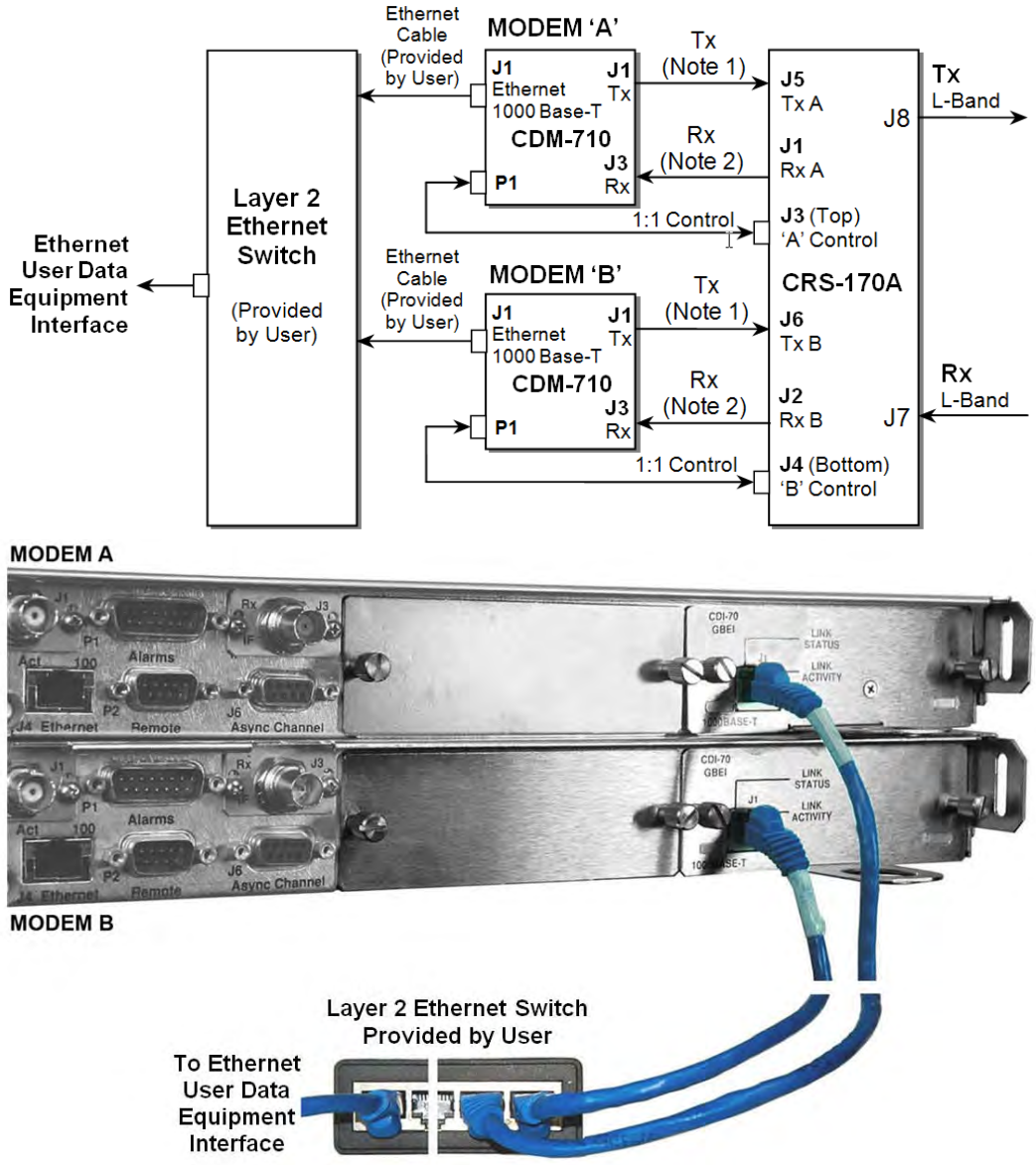


Figure 4-42. CDM-710 Gigabit Ethernet (GigE) 1:1 Example

4.8 Cabling to the CDM-710G

1. ***For information on configuring the CRS-170A L-Band 1:1 Redundancy Switchwith the CDM-710 Broadcast Satellite Modems for 1:1 operation, see:***
   - **Chapter 3. MODEM AND SWITCH CONFIGURATION**
   - **CDM-710G High-Speed Satellite Modem Installation and Operation Manual (CEFD P/N MN-CDM710G.IOM)**

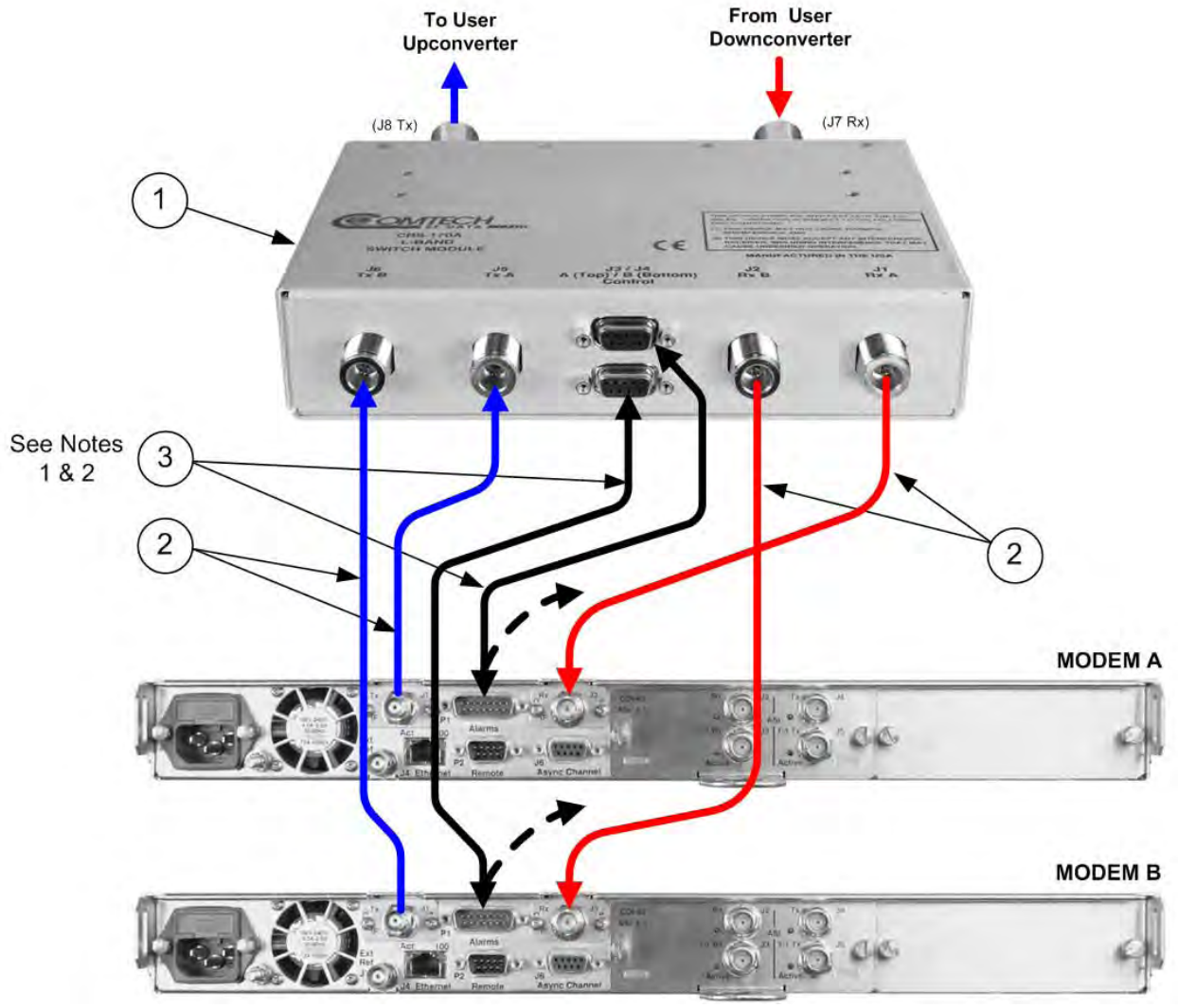
2. ***For information on the cables and cable assemblies specified in this section, see:***
   - **Appendix A. CABLE DRAWINGS**

4.8.1 Modem-to-Switch Control and IF Interface Connection

Figure 4-43 shows the control and IF connections for the CDM-710G to the CRS-170A. As with the CDM-710, all control and IF components are provided for the CDM-710G in the KT/12551 CRS-170A L-Band 1:1 Redundancy Kit (terrestrial data interface components/kits must be ordered separately). **Note the following:**

1. To provide user access to modem "Fault Summary Relay," Control 'Y' Cable CA/WR13011-4, sold separately, is available for use in place of the CA/WR12135-1 cable.

2. Control Cable CA/WR12135-1 will mute the Offline modem's Tx IF. If this is not desired, then an alternate cable, Control Cable CA-0000187, sold separately, is available for use in place of the CA/WR12135-1 cable.



KT/12551 CRS-170A L-Band 1:1 Redundancy Kit			
Item	CEFD Part No.	Qty	Description
1	PL/10129-1	1	CRS-170A Switch – Top Assembly
2	CA/RF10453-4	4	Cable – RoHS-Compliant, L-Band Type 'N', 4'
3	CA/WR12135-1 (Notes 1,2)	2	Cable Assy – RoHS-Compliant, Control Adapter

Figure 4-43. CDM-710G Modem-to-Switch Control & IF Connections – KT/12551

4.8.2 Modem-to-User Data Interface Kit and Connection Examples

In addition to the basic switch-to-modem cabling shown in the previous section, there are a number of data interface configuration kits available for use with the CDM-710G.

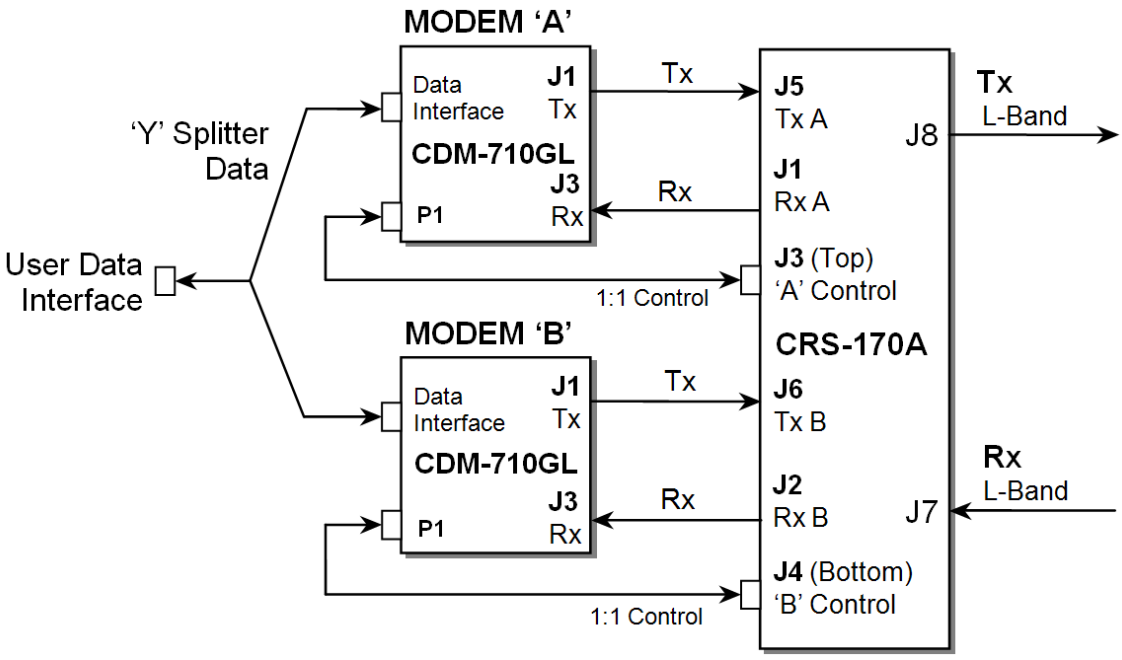


Figure 4-44. CDM-710G Block Diagram: User → Modem → Switch → Traffic

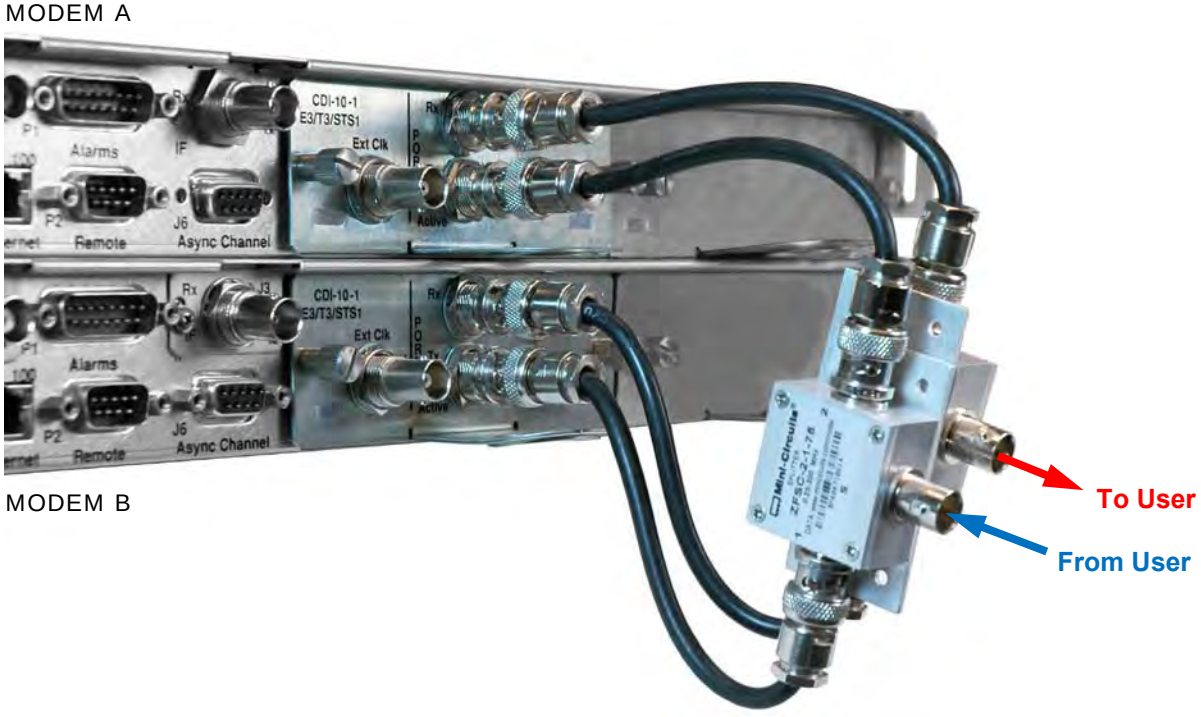
Figure 4-44 shows a block diagram typical for the kits shown in **Sects. 4.7.2.1** and **Sect. 4.7.2.2**. **Separate cabling kits are needed for these CDM-710G data interfaces.** For example, **Sect. 4.7.2.1** identifies the interface kit used for the CDI-10-1 Single G.703 Data Interface. With the exception of the CDI-70 Gigabit Ethernet Data Interface configuration shown in **Sect. 4.7.2.3**, where user-provided Ethernet cables and Layer 2 Switch are used, one interface kit per 1:1 modem pair is required for each interface (see examples for specified quantities).

The data interface combinations allowable in Interface Slots 1 and 2 of the CDM-710G chassis are as follows:

Allowable CDM-710G Combinations	
Interface Slot 1	Interface Slot 2
Single G.703 (CDI-10-1)	None
HSSI (CDI-60)	None
None	GigE (CDI-70)

4.8.2.1 Single G.703 E3/T3/STS-1 75Ω Data Interface (CDI-10-1) Kit KT/12583

Figure 4-45 shows an example of a CDM-710G 1:1 modem configuration with the CDI-10-1 Single G.703 Data Interface installed in Slot 1, and Slot 2 empty. The figure depicts installation of one KT/12583 Single G.703 Interface Kit.



KT/12583 Single G.703 (CDI-10-1) 75Ω Interface Kit		
CEFD Part No.	Qty	Description
CA/BNC75OHM	4	Cable – IF BNC, 75Ω, 1'
RF/SA32KC-IN/OUT	2	Combiner – 2-way w/Bracket, 0.25-300 MHz, 75Ω BNC

Figure 4-45. CDM-710G Single G.703 E3/T3/STS-1 1:1 Example

4.8.2.2 HSSI Data Interface (CDI-60) Kit KT/12586

Figure 4-46 shows an example of a CDM-710G 1:1 modem configuration with the CDI-60 HSSI Data Interface installed in Slot 1, and Slot 2 empty. The figure depicts installation of one KT/12586 HSSI Interface Kit.

KT/12586 HSSI (CDI-60) Interface Kit		
CEFD Part No.	Qty	Description
PP/SC3523	1	Cable - RoHS-Compliant, HSSI 'Y' Splitter, (2X) HD-50M → HD-50F, 3"

Figure 4-46. CDM-710G HSSI 1:1 Example

4.8.2.3 Gigabit Ethernet Interface (CDI-70) Example

See CEFD White Paper "Bridged Ethernet Interface Redundancy" available for download from Comtech EF Data's Web site (www.comtechefdata.com).

Figure 4-47 shows a block diagram and cabling example of a CDM-710G 1:1 modem configuration with the CDI-70 Gigabit Ethernet Data Interface installed in Slot 2, and Slot 1 empty. User-provided Ethernet cables are connected directly to the interface, so no kit is required.

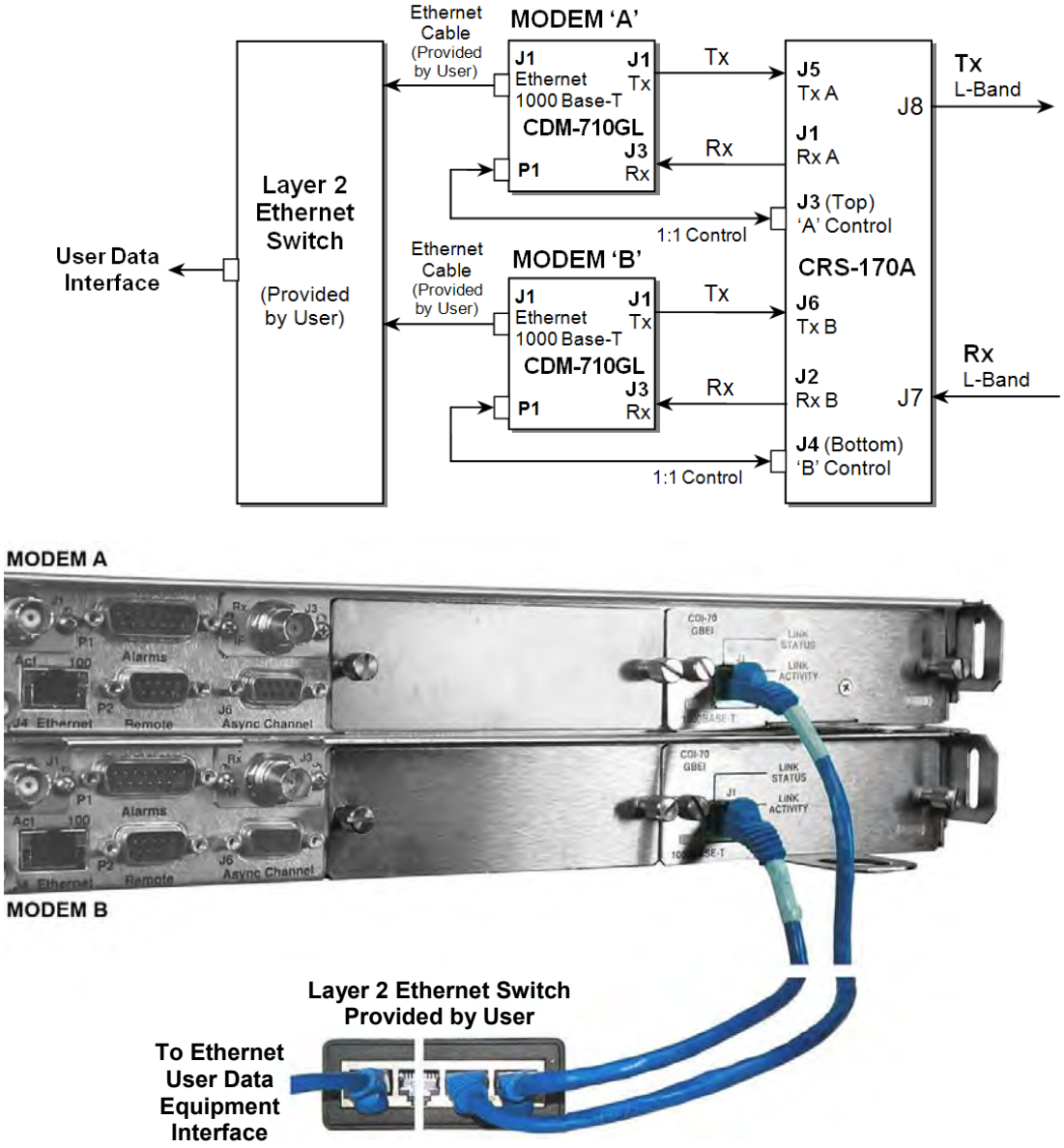


Figure 4-47. CDM-710G Gigabit Ethernet (GigE) 1:1 Example

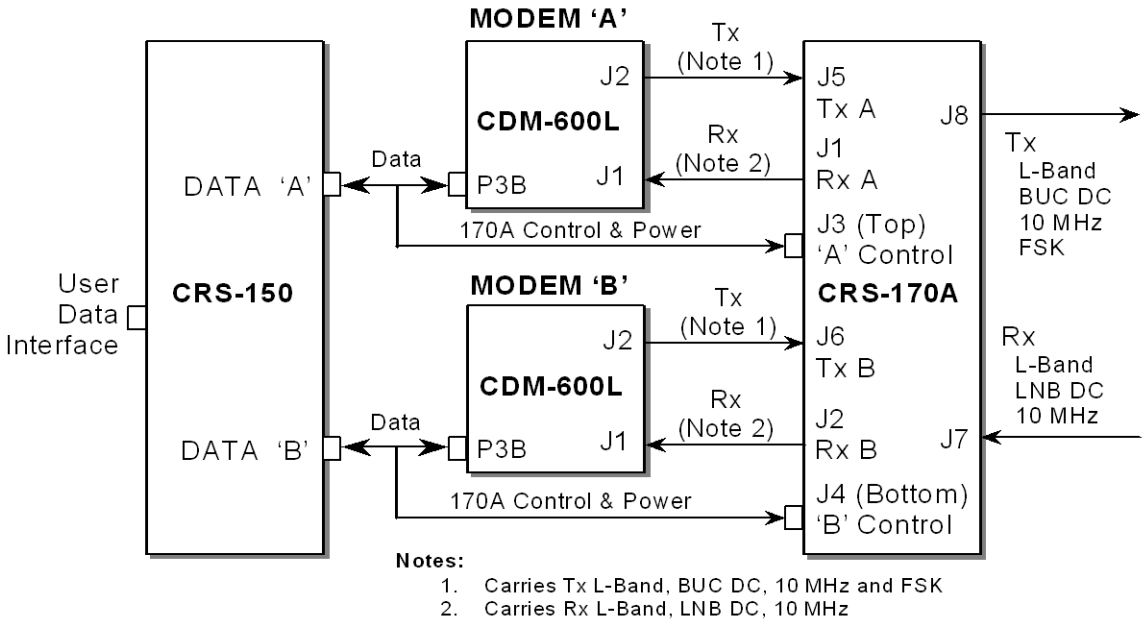
4.9 Cabling the CDM-600L (CLM-9600L)

- **Comtech EF Data CLM-9600L Open Network Satellite Modem Installation and Operation Manual (CEFD P/N MN/CLM9600L.IOM)**
- **Comtech EF Data CRS-150 1:1 Redundancy Switch Installation and Operation Manual (CEFD P/N MN/CRS150.IOM)**
- **Appendix A. CABLE DRAWINGS**

The block diagram shown in **Figure 4-48** depicts connection of a pair of CDM-600L (CLM-9600L) Open Network Satellite Modems together with the CRS-150 and CRS-170A switches.

Cable assemblies that may be supplied with the CRS-170A when used with the CDM-600L (CLM-9600L) and CRS-150 are listed in the table included in **Figure 4-48**.

When connecting the Control cable between the CRS-170A and the modems, ensure that screw locks on the 'D' type connectors are securely fastened. This will prevent the accidental unmating of the cable, particularly when a standby unit is being removed or replaced.



CEFD Part No.	Qty	Description
CA/WR10456-4	2	Cable – 1:1 Y-Splitter, Data/Control, DB-25M → DB-25M, 4' / DB-9M, 1'
CA/RF10453-4	4	RoHS-Compliant Cable – IF (Tx/Rx), 50Ω Type 'N', 4'

Figure 4-48. CDM-600L (CLM-9600L) Block Diagram: Cable Connections

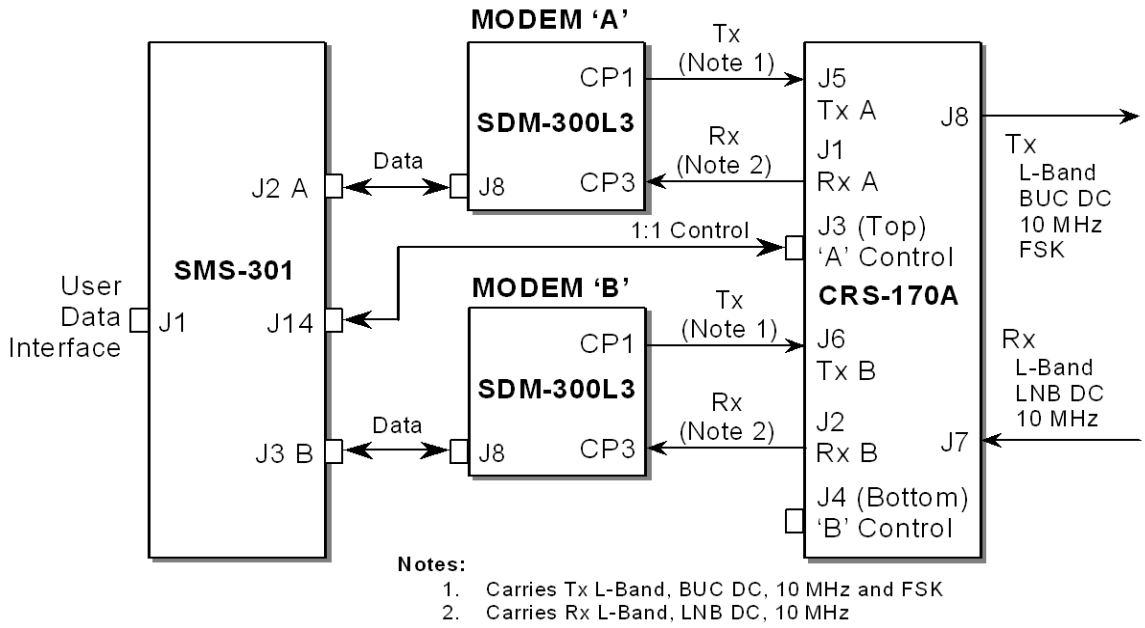
4.10 Cabling the SDM-300L3

- **Comtech EF Data SDM-300L3 Satellite Modem Installation and Operation Manual (CEFD P/N MN/SDM300L3.IOM)**
- **Comtech EF Data SMS-301 Redundancy Switch Installation and Operation Manual (CEFD P/N MN/SMS301.IOM)**
- **Appendix A. CABLE DRAWINGS**

The block diagram shown in **Figure 4-49** depicts connection of a pair of SDM-300L3 Satellite Modems together with the SMS-301 and CRS-170A switches.

Cable assemblies that may be supplied with the CRS-170A when used with the SDM-300L3 and SMS-301 are listed in the table inlcuded in **Figure 4-49**. The other cables between the SMS-301 and the SDM-300L3 are the same cables supplied with the SMS-301 in an SDM-300A application.

When connecting the Control cable between the CRS-170A and the SMS-301, ensure that screw locks on the 'D' type connectors are securely fastened. This will prevent the accidental unmating of the cable, particularly when a standby unit is being removed or replaced.



CEFD Part No.	Qty	Description
CA/WR10163-1	1	Cable – Control, SMS-301 → CRS-170A, DB-15M → DB-9M, 4'
CA/RF10453-4	4	RoHS-Compliant Cable – IF (Tx/Rx), 50 Ω Type 'N', 4'

Figure 4-49. SDM-300L3 Block Diagram: Cable Connection

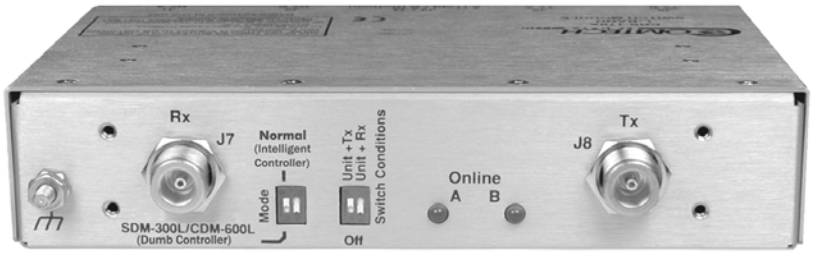
Chapter 5. CONNECTOR PINOUTS

5.1 Overview

The CRS-170A L-Band 1:1 Redundancy Switch connectors, shown in **Figure 5-1**, provide all necessary external connections between the switch module and the specified Comtech EF Data modem.

J6 **TX B** J5 **TX A** J3 **Control A** J2 **RX B** J1 **RX A**
J4 **Control B**

Modem Side Connectors



Antenna Side Connectors (Rev. A and later version shown)

To maintain compliance with the European EMC Directive (EN55022, EN50082-1) properly shielded cables are required for data I/O.

Figure 5-1. CRS-170A – Modem and Antenna Side Connectors

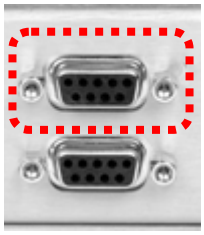
5.2 Modem Side: Type 'N' IF Connectors

Four 50Ω Type 'N' female connectors are provided on the modem side of the CRS-170A L-Band 1:1 Redundancy Switch module. Refer to **Table 5-1** for details.

Table 5-1. Modem Side Type 'N' Connectors

Type 'N' Connector	Ref Des	Description	Direction
RX A	J1	RX-IF signal	Out
		LNB 10 MHz Ref	In
		LNB Power	In
RX B	J2	RX-IF signal	Out
		LNB 10 MHz Ref	In
		LNB Power	In
TX A	J5	TX-IF signal	In
		BUC 10 MHz Ref	In
		BUC FSK Comm.	In/Out
		BUC Power	In
TX B	J6	TX-IF signal	In
		BUC 10 MHz Ref	In
		BUC FSK Comm.	In/Out
		BUC Power	In

5.3 J3 Control Connector – Modem 'A' (Top), DB-9F



The Modem 'A' Control connector is a 9-pin Type 'D' female interface located on the modem side of the CRS-170A L-Band 1:1 Redundancy Switch module. Refer to **Table 5-2** for pin assignments.

Table 5-2. J3 - Modem 'A' Control Connector Pin Assignments

Pin #	Signal Function	Signal Name	Direction
1	Signal Ground	Ground	-
2	Modem B Tx Comm	AUX_SER_TX_B	Out
3	Modem B Clk Out	CLK_OUT_B	Out
4	Modem A Online	ONLINE_A	Out
5	Signal Ground	Ground	-
6	Modem A Tx Comm	AUX_SER_TX_A	In
7	Modem A Clk In	CLK_IN_A	In
8	Modem A Serial Faults	SERIAL_FAULT_A	In
9	+12 VDC	+12VDC	In

Note the following:

- Pins 2, 3, and 4 carry signals looped through the switch module from **Modem B** to **Modem A**, while pins 6, 7, and 8 loop the same signals from **Modem A** through to **Modem B**.

- The 12VDC input, which is diode OR'ed with the corresponding 12VDC input from **Modem B**, powers the switch module.

5.4 J4 Control Connector – Modem 'B' (Bottom), DB-9F

The Modem 'B' Control connector is a 9-pin Type 'D' female interface located on the modem side of the CRS-170A L-Band 1:1 Redundancy Switch module. Refer to **Table 5-3** for pin assignments.

Table 5-3. J4 - Modem 'B' Control Connector Pin Assignments

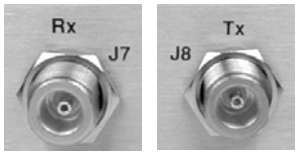
Pin #	Signal Function	Signal Name	Direction
1	Signal Ground	Ground	-
2	Modem A Tx Comm	AUX_SER_TX_A	Out
3	Modem A Clk Out	CLK_OUT_A	Out
4	Modem B Online	ONLINE_B	Out
5	Signal Ground	Ground	-
6	Modem B Tx Comm	AUX_SER_TX_B	In
7	Modem B Clk In	CLK_IN_B	In
8	Modem B Serial Faults	SERIAL_FAULT_B	In
9	+12 VDC	+12VDC	In

Note the following:

- Pins 2, 3, and 4 carry signals looped through the switch module from **Modem A** to **Modem B**, while pins 6, 7, and 8 loop the same signals from **Modem B** through to **Modem A**.

- The 12VDC input, which is diode OR'ed with the corresponding 12VDC input from **Modem A,** powers the switch module.

5.5 Antenna Side: Type ‘N’ IF Connectors



The 50Ω female Type ‘N’ connectors on the antenna side of the CRS-170A L-Band 1:1 Redundancy Switch module provide the coaxial cable connections to the outdoor receive and transmit equipment (BUC and LNB).

Table 5-4. Antenna Side Type ‘N’ Connectors

Type ‘N’ Connector	Ref Des	Description	Direction
RX	J7	RF Input	In
		LNB 10 MHz Ref	Out
		LNB Power	Out
TX	J8	RF Output	Out
		BUC 10 MHz Ref	Out
		BUC FSK	In/Out
		Comm.	Out

Notes:

Appendix A. CABLE DRAWINGS

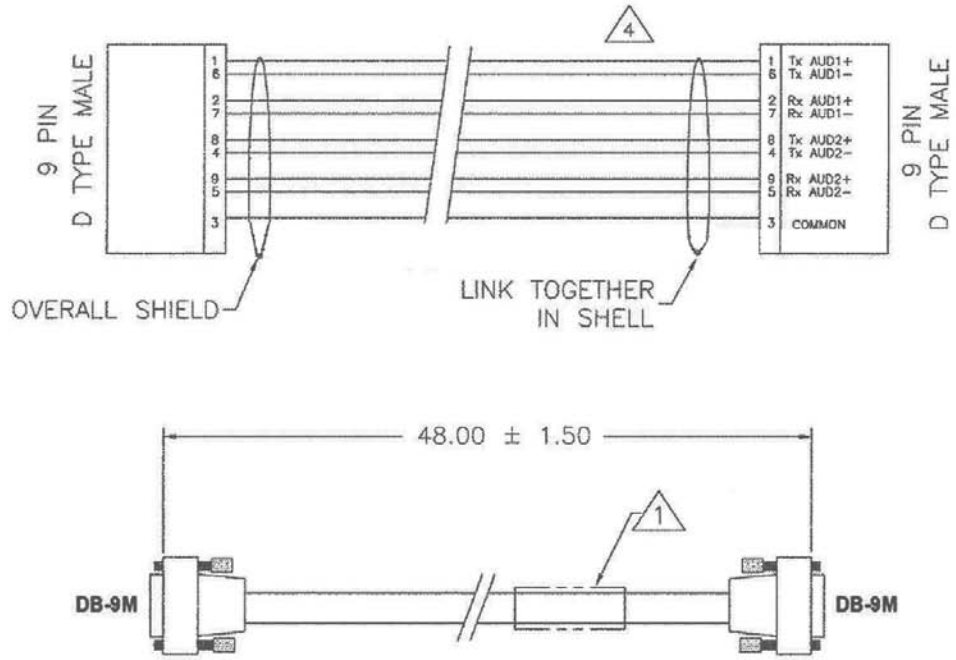
A.1 Introduction

This appendix contains drawings of cables used with the CRS-170A L-Band 1:1 Redundancy Switch. These cables are broken into two categories: Control Interface Cables and IF / Data Interface Cables. Each section provides illustrations of the cables' technical specifications; additionally, the tables cross-reference each cable to the applicable modem-specific cabling figures provided in **Chapter 4. CABLES AND CONNECTIONS**.

A.2 Control Interface Cables

App. A FIG	CABLE CEFD P/N	DESCRIPTION	USED FOR (TYPE)	USED WITH CRS-170A →	REF Ch. 4 FIG
A-1	CA/WR9378-4	Universal Cable, Control DB-9M → DB-9M, 4'	1:1 Control	CDM-625/A	4-1
				CDM-840	4-16
				CDM-750/CDM-760	4-20
				CDM-570L	4-25
A-2	CA/WR12135-1	Adapter Cable, Control, RoHS, DB-15F → DB-9M, 6'	1:1 Control	CDM-700	4-32
				CDM-710	4-38
				CDM-710G	4-43
A-3	CA/WR13011-4	Optional Adapter Cable, Control 'Y' Splitter, DB-15F →DB-9M (4'), DB-9M (6") (Alternate to CA/WR12135-1)	1:1 Control, Summary Fault Relay	CDM-700	4-32
				CDM-710	4-38
				CDM-710G	4-43
A-4	CA-0000187	Optional Cable, Control, Non-muting, DB-15F → DB-9M, 6' (Alternate to CA/WR12135-1)	1:1 Control (Non-mute Tx IF)	CDM-700	4-32
				CDM-710	4-38
				CDM-710G	4-43
A-5	CA/WR10456-4	Control/Data Cable, Y-Splitter, DB-25M → DB-25M (4'), DB-9M (1')	1:1 Data/Control	CDM-600L (CDM-9600L) → CRS-150	4-48
A-6	CA/WR10163-1	Control Cable, DB-15M → DB-9M, 4'	1:1 Control	SDM-300L3 → SMS-301	4-49

A.2.1 Universal Control Cable, DB-9M → DB-9M



INDICATORS		
9M	NOTES	9M
1	TO	1
2	TO	2
3	TO	3
4	TO	4
5	TO	5
6	TO	6
7	TO	7
8	TO	8
9	TO	9

4. PAIR UP TWISTED PAIRS AS SHOWN ON DRAWING. WIRE REMAINING TWISTED PAIRS STRAIGHT THRU.

3. ENSURE SHIELDING FOIL AND/OR BRAID IS BONDED TO METAL BACKSHELL FOR EMI SHIELDING.

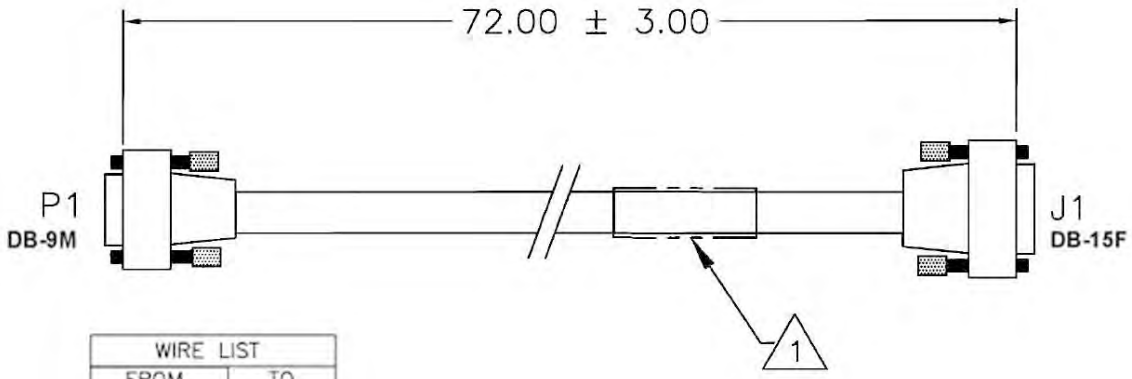
2. REFER TO MN/4905 FOR DETAILED INSTRUCTIONS REGARDING EMI ASSEMBLY PROCESS.

1. IDENTIFY CABLE PART NUMBER AND REV LEVEL USING LABEL OR STICKER.

NOTES: UNLESS OTHERWISE SPECIFIED:

Figure A-1. Universal Control Cable (CEFD P/N CA/WR9378-4)

A.2.2 Adapter Control Cable, RoHS, DB-9M → DB-15F



WIRE LIST	
FROM	TO
P1–1,5	J1–1
P1–2	J1–10
P1–3	J1–14
P1–4	J1–9
P1–6	J1–2
P1–7	J1–11
P1–8	J1–3
P1–9	J1–12
J1–4	J1–9

5. ALL SOLDER AND OTHER PROCESS RELATED MATERIALS MUST BE RoHS COMPLIANT IN ACCORDANCE WITH DIRECTIVE 2002/95/EC.

△4 FOLD BACK FOIL AND BRAID FROM CABLE, ITEM 1, OVER GROMMET AND SEAL WITH COPPER TAPE, ITEM 6, AS SHOWN IN DETAIL A.

△3 ALL WIRE TERMINATIONS SHALL HAVE A MINIMUM OF .25 INCH OF HEAT SHRINK, ITEM 5, OVER EACH SOLDER JOINT. SEE DETAIL B.

2. STRIP AND/OR TIN WIRES AS REQUIRED FOR INSTALLING TERMINALS OR CONNECTORS USING MANUFACTURERS INSTALLATION PROCEDURE.

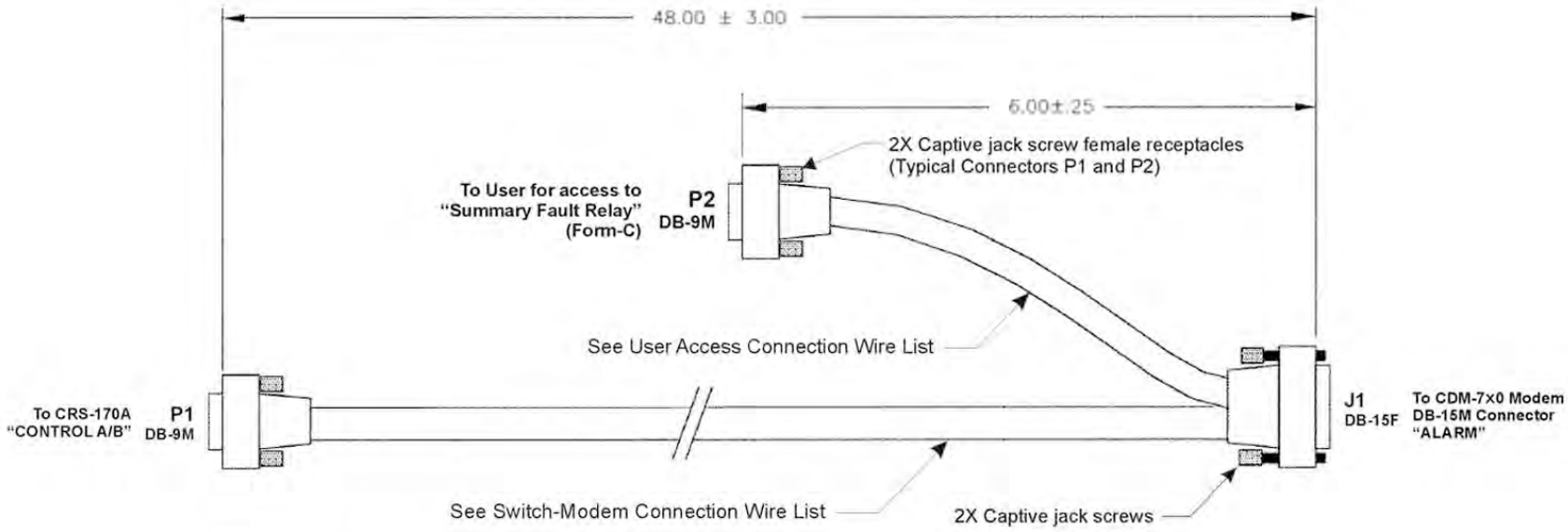
△1 APPLY CABLE PART NUMBER AND THE BOM REV LETTER TO LABEL IN .12 HIGH CHARACTERS, USING PERMANENT MARKING, COLOR BLACK, LOCATE APPROXIMATELY WHERE SHOWN.

NOTES: UNLESS OTHERWISE SPECIFIED:

Figure A-2. Adapter Control Cable (CEFD P/N CA/WR12135-1)

A.2.3 Optional 'Y' Splitter Adapter Control Cable, (2X) DB-9M → DB-15F

The optional CA/WR13011-4 'Y' Splitter Adapter Control Cable, sold separately, is used in replacement of the CA/WA12135-1 cable. This cable permits user access to the Summary Fault Relay.



User Access Connection Wire List		
From	To	Signal Name*
P2-4	J1-7	COM
P2-5	J1-8	NO
P2-9	J1-15	NC

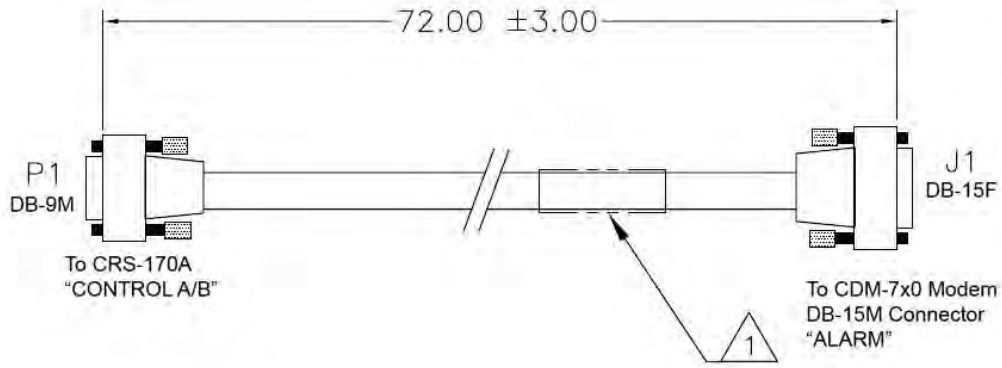
*Note: Signal Names refer to "No Fault" (Normal) condition

Switch-Modem Connection Wire List	
From	To
P1-1,5	J1-1
P1-2	J1-10
P1-3	J1-14
P1-4	J1-9
P1-6	J1-2
P1-7	J1-11
P1-8	J1-3
P1-9	J1-12
J1-4	J1-9

Figure A-3. Optional 'Y' Splitter Adapter Control Cable, (CEFD P/N CA/WR13011-4)

A.2.4 Optional Control Cable, Non-muting, DB-9M → DB-15F

The optional CA-0000187 Control Cable, sold separately, is used in replacement of the CA/WA12135-1 cable. This cable keeps the offline modem's Tx IF-enabled.



WIRE LIST	
FROM	TO
P1–1,5	J1–1
P1–2	J1–10
P1–3	J1–14
P1–4	J1–4
P1–6	J1–2
P1–7	J1–11
P1–8	J1–3
P1–9	J1–12

5. ALL SOLDER AND OTHER PROCESS RELATED MATERIALS MUST BE RoHS COMPLIANT IN ACCORDANCE WITH DIRECTIVE 2002/95/EC.

4. FOLD BACK FOIL AND BRAID FROM CABLE, OVER CABLE INSULATION AND SEAL WITH COPPER TAPE.

3. ALL WIRE TERMINATIONS SHALL HAVE A MINIMUM OF .25 INCH OF HEAT SHRINK, OVER EACH SOLDER JOINT.

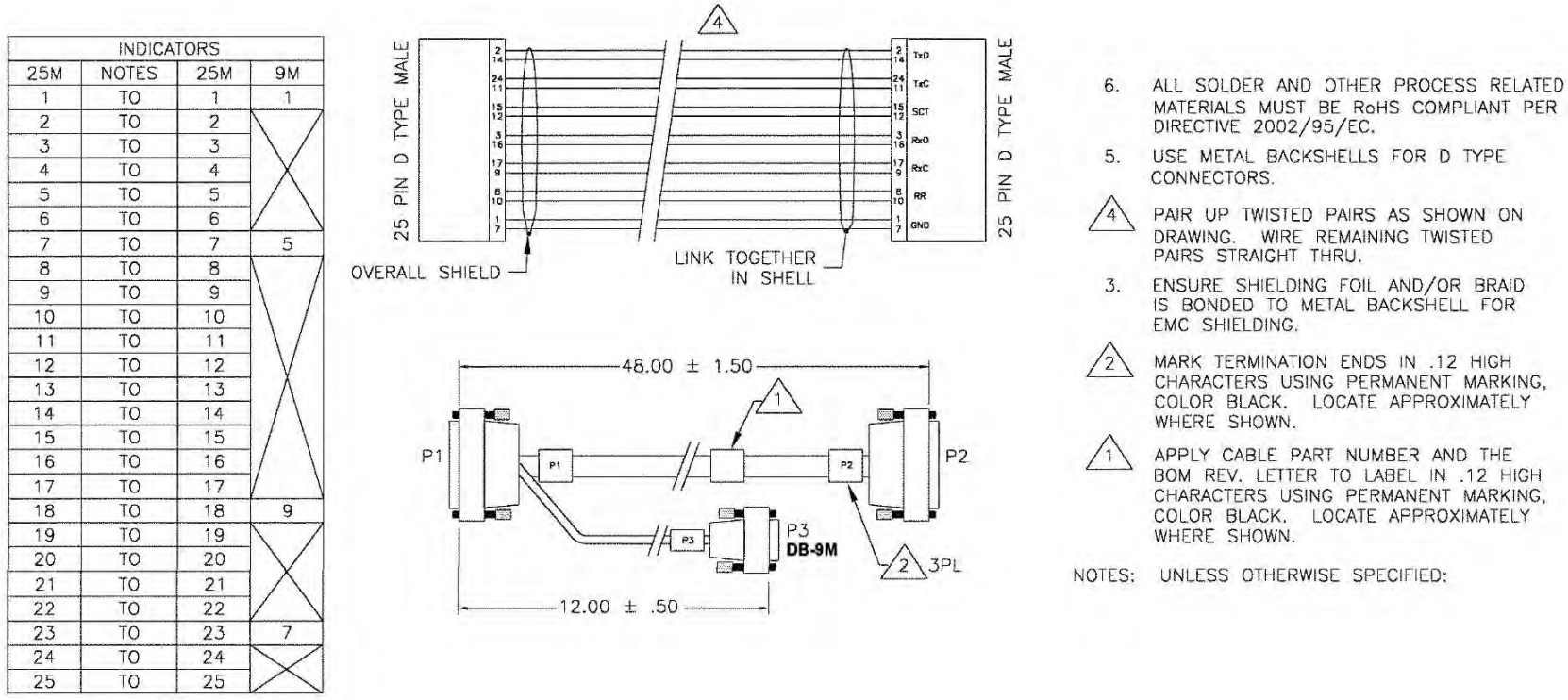
2. STRIP AND/OR TIN WIRES AS REQUIRED FOR INSTALLING TERMINALS OR CONNECTORS USING MANUFACTURERS INSTALLATION PROCEDURE.

1 APPLY CABLE PART NUMBER AND THE BOM REV LETTER TO LABEL IN .12 HIGH CHARACTERS, USING PERMANENT MARKING, COLOR BLACK, LOCATE APPROXIMATELY WHERE SHOWN.

NOTES: UNLESS OTHERWISE SPECIFIED:

Figure A-4. Optional Control Cable (CEFD P/N CA-0000187)

A.2.5 Data / Control 'Y' Cable, Modem to CRS-170A and CRS-150, DB-25M → DB-25M, DB-9M



INDICATORS			
25M	NOTES	25M	9M
1	TO	1	1
2	TO	2	
3	TO	3	
4	TO	4	
5	TO	5	
6	TO	6	
7	TO	7	5
8	TO	8	
9	TO	9	
10	TO	10	
11	TO	11	
12	TO	12	
13	TO	13	
14	TO	14	
15	TO	15	
16	TO	16	
17	TO	17	
18	TO	18	9
19	TO	19	
20	TO	20	
21	TO	21	
22	TO	22	
23	TO	23	7
24	TO	24	
25	TO	25	

6. ALL SOLDER AND OTHER PROCESS RELATED MATERIALS MUST BE RoHS COMPLIANT PER DIRECTIVE 2002/95/EC.
5. USE METAL BACKSHELLS FOR D TYPE CONNECTORS.
4. PAIR UP TWISTED PAIRS AS SHOWN ON DRAWING. WIRE REMAINING TWISTED PAIRS STRAIGHT THRU.
3. ENSURE SHIELDING FOIL AND/OR BRAID IS BONDED TO METAL BACKSHELL FOR EMC SHIELDING.
2. MARK TERMINATION ENDS IN .12 HIGH CHARACTERS USING PERMANENT MARKING, COLOR BLACK. LOCATE APPROXIMATELY WHERE SHOWN.
1. APPLY CABLE PART NUMBER AND THE BOM REV. LETTER TO LABEL IN .12 HIGH CHARACTERS USING PERMANENT MARKING, COLOR BLACK. LOCATE APPROXIMATELY WHERE SHOWN.

NOTES: UNLESS OTHERWISE SPECIFIED:

Figure A-5. Data / Control 'Y' Cable (CEFD P/N CA/WR10456-4)

A.2.6 Control Cable, Modem to CRS-170A and SMS-301, DB-9M → DB-15M

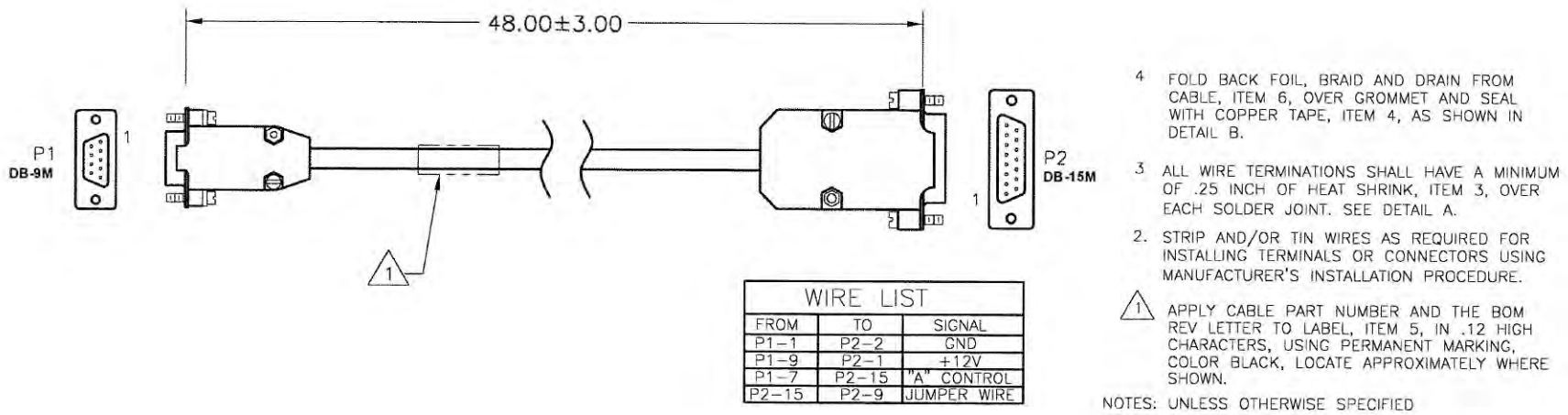

48.00±3.00
P1
DB-9M
1
P2
DB-15M
1
1
WIRE LIST
FROM TO SIGNAL
P1–1 P2–2 GND
P1–9 P2–1 +12V
P1–7 P2–15 "A" CONTROL
P2–15 P2–9 JUMPER WIRE
4 FOLD BACK FOIL, BRAID AND DRAIN FROM CABLE, ITEM 6, OVER GROMMET AND SEAL WITH COPPER TAPE, ITEM 4, AS SHOWN IN DETAIL B.
3 ALL WIRE TERMINATIONS SHALL HAVE A MINIMUM OF .25 INCH OF HEAT SHRINK, ITEM 3, OVER EACH SOLDER JOINT. SEE DETAIL A.
2. STRIP AND/OR TIN WIRES AS REQUIRED FOR INSTALLING TERMINALS OR CONNECTORS USING MANUFACTURER'S INSTALLATION PROCEDURE.
1 APPLY CABLE PART NUMBER AND THE BOM REV LETTER TO LABEL, ITEM 5, IN .12 HIGH CHARACTERS, USING PERMANENT MARKING, COLOR BLACK, LOCATE APPROXIMATELY WHERE SHOWN.
NOTES: UNLESS OTHERWISE SPECIFIED

Figure A-6. Control Cable (CEFD P/N CA/WR10163-1)

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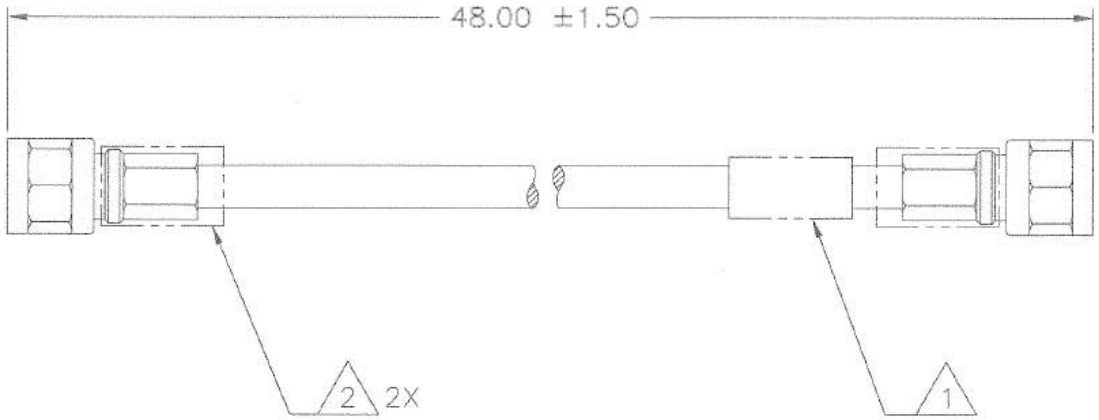
A.3 IF / Data Interface Cables

App. A FIG	CABLE CEFD P/N	DESCRIPTION	USED FOR (TYPE)	USED WITH CRS-170A →	REF Ch. 4 FIG
A-7	CA/RF10453-4	RoHS Coax Cable, Type 'N' 50Ω, 4'	Modem → Switch IF Interface	CDM-625/A	4-2
				CDM-625/A	4-3
				CDM-840	4-17
				CDM-750/CDM-760	4-20
				CDM-570L	4-26
				CDM-700	4-32
				CDM-710	4-38
				CDM-710G	4-43
				CDM-600L (CLM-9600L)	4-48
				SDM-300L3	4-49
A-8	CA/BNC75OHM	RoHS Coax Cable, Type 'BNC' 75Ω, 1'	Modem → Switch IF Interface	CDM-625/A	4-3
			ASI Data Interface	CDM-625/A	4-7
			G.703 Unbalanced Data Interface	CDM-625/A	4-10
			G.703 E1 Unbalanced Data Interface	CDM-840	4-19
			Single G.703 E3/T3 PIIC Data Interface	CDM-750/CDM-760	4-24
			G.703 Unbalanced Data Interface	CDM-570L	4-30
			Dual G.703 E3/T3/STS-1 Data Interface	CDM-700	4-34
			155MB Copper Data Interface	CDM-700	4-35
			ASI Data Interface	CDM-710	4-40
			Single G.703 E3/T3/STS-1 Data Interface	CDM-710G	4-45
A-9	CA/RB10461-1	1:1 Y-Splitter Cable, DB-25F (1")→ (2X) DB-25M (4")	EIA-422/232, V.35 Data Interfaces	CDM-625/A	4-5
			HSSI Data Interface	CDM-625/A	4-6
			EIA-422/232 Data Interface	CDM-570L	4-28

App. A FIG	CABLE CEFD P/N	DESCRIPTION	USED FOR (TYPE)	USED WITH CRS-170A →	REF Ch. 4 FIG
A-10	CA-0000071	1:1 'Y' Splitter Cable, (2X) DB-9M → DB-9F, 8"	Quad E1 Data Interface	CDM-625/A	4-8
			G.703 Balanced Data Interface	CDM-625/A	4-9
			ESC Data Interface	CDM-625/A	4-12
A-11	CA-0000163	Cable Assy – Optional 1:1 'Y' Splitter, (2X) DB-15F → DB-9M, 6"	Quad E1 Data Interface	CDM-625/A	4-8
A-12	CA-0000164	Cable Assy – Optional 1:1 'Y' Splitter, (2X) RJ-48F → DB-9M, 6"	Quad E1 Data Interface	CDM-625/A	4-8
A-13	KT-0000122	Cable Assy – Optional 1:1 'Y' Splitter, (4X) BNC → DB-9M, 6"	Quad E1 Data Interface	CDM-625/A	4-8
A-14	CA-0000070	1:1 'Y' Splitter Cable, (2X) HD-44M → HD-44F, 8"	Overhead Data Interface	CDM-625/A	4-11
A-15	CA-0000276	Shielded Multi-drop CnC® Plus Cable, 1:1, DB-9M → DB-9M, 1'	PMSI/CnC® Data Interface	CDM-625/A	4-15
A-16	CA-0000560	RoHS Cable Assy –Optical Coupler, 2m (6.56'), Type 'LC' Connectors	Optical Gigabit Ethernet Single-Mode Data Interface	CDM-750/CDM-760	4-22
	CA-0000559	RoHS Cable Assy –Optical Coupler, 2m (6.56'), Type 'LC' Connectors	Optical Gigabit Ethernet Multi-Mode Data Interface	CDM-750/CDM-760	4-22
A-17	CA/WR10522-1	1:1 'Y' Splitter Cable, (2X) DB-15M → DB-15F, 5"	G.703 Balanced Data Interface	CDM-570L	4-29
A-18	PP/SC3523	RoHS Cable Assy – HSSI 'Y' Splitter, (2X) HD-50M → HD-50F, 3"	HSSI Data Interface	CDM-700	4-34
				CDM-710	4-41
				CDM-710G	4-46
A-19	PP/CPS2A12501	RoHS Cable Assy –Optical Coupler, 7' Type 'SC/UPC' Connectors	OC-3 Single-Mode Data Interface	CDM-700	4-36
	PP/CPM6A1250	RoHS Cable Assy – Optical Coupler, 7' Type 'SC/UPC' Connectors	OC-3 Multi-Mode Data Interface		4-36

A.3.1 Modem to CRS-170A, L-Band Coaxial Cable, RoHS, Type ‘N’ 50Ω



2 INSTALL HEAT SHRINK SLEEVING, 1.00 INCH LONG, OVER CABLE AND REAR OF CONNECTOR.

1 APPLY PART NUMBER AND REVISION TO LABEL IN .12 HIGH CHARACTERS, COLOR BLACK, USING PERMANENT INK, LOCATE APPROXIMATELY WHERE SHOWN.

NOTES: UNLESS OTHERWISE SPECIFIED

Figure A-7. Tx/Rx 50Ω Type ‘N’ Coaxial Cable (CEFD P/N CA/RF10453-4)

A.3.2 Modem to CRS-170A or User, 70/140 MHz Coaxial Cable, RoHS, Type ‘BNC’ 75Ω

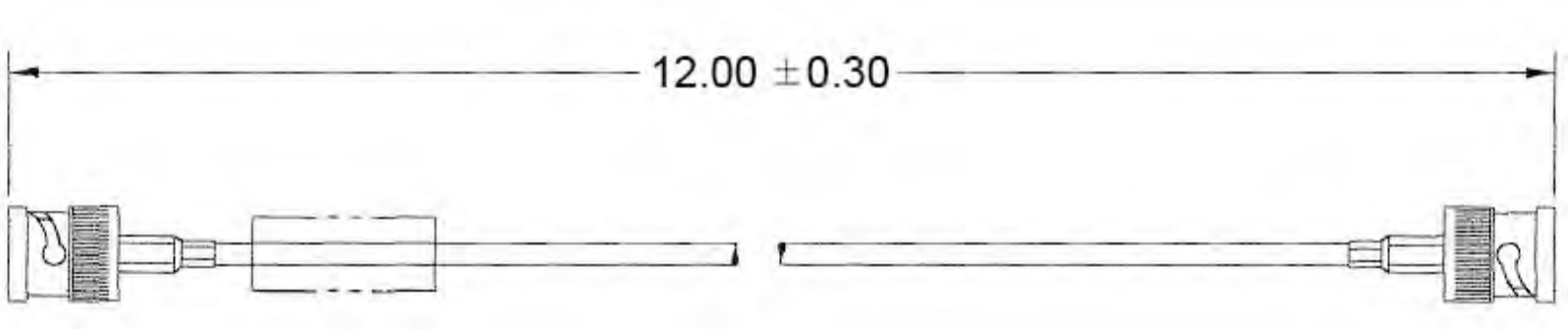


Figure A-8. Tx/Rx/User Data 75Ω Type ‘BNC’ Coaxial Cable (CEFD P/N CA/BNC75OHM)

A.3.3 Modem to User, Splitter Cable, (2X) DB-25M → DB-25F

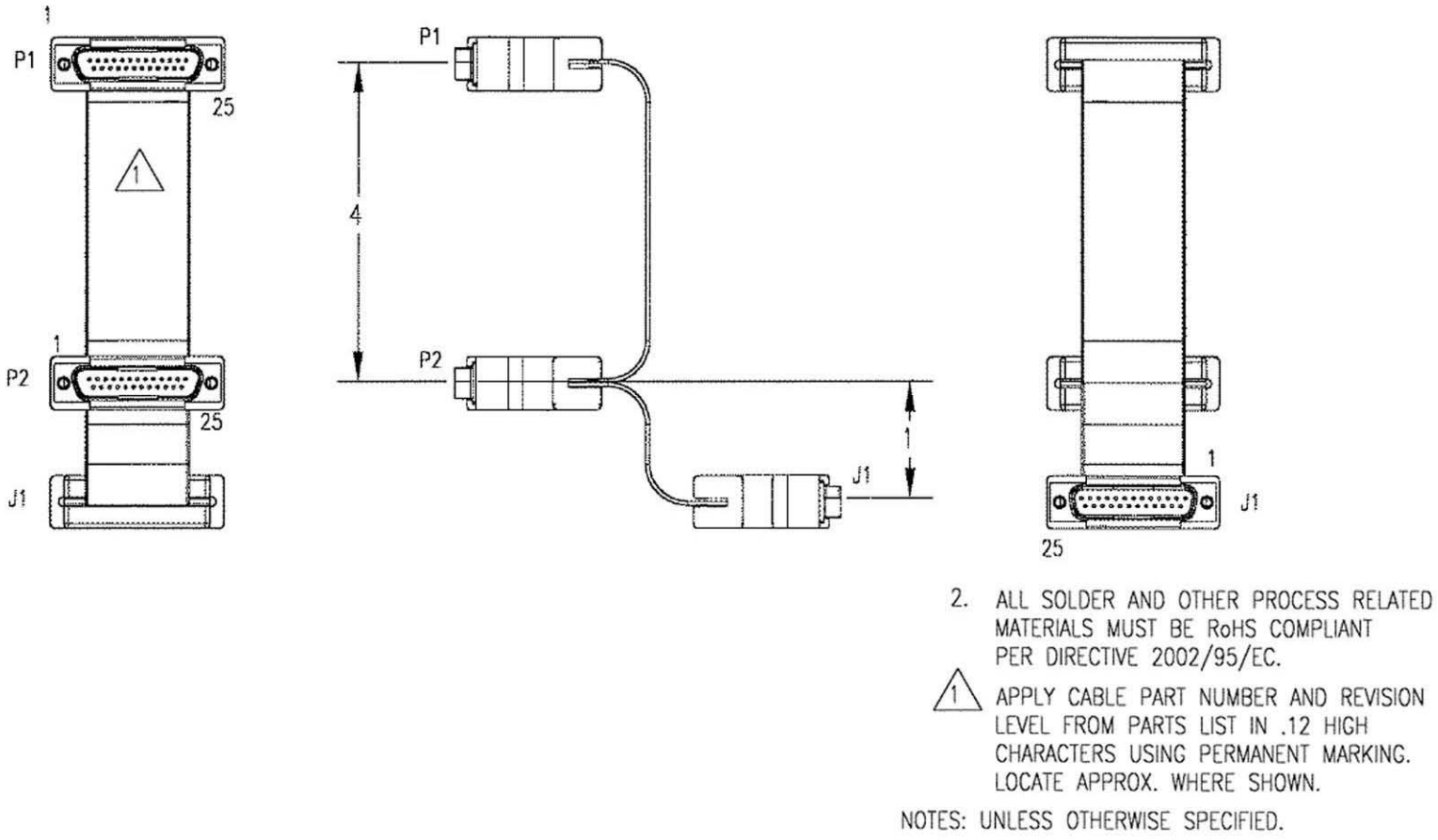
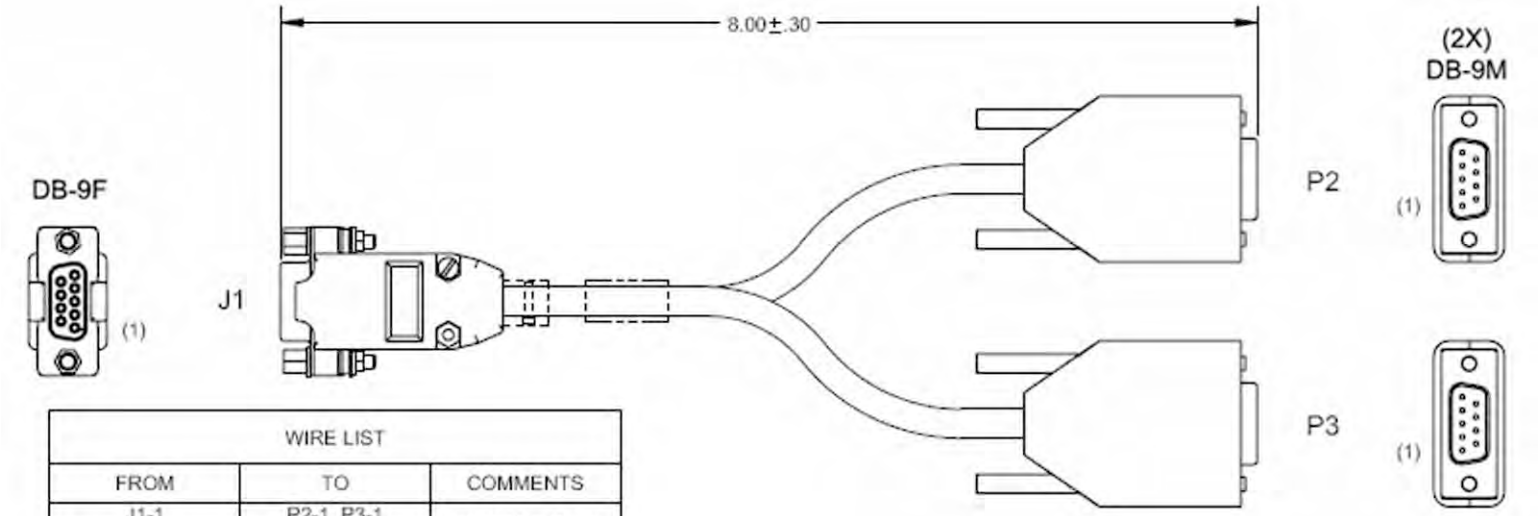


Figure A-9. 1:1 User Data Splitter Cable (CEFD P/N CA/RB10461-1)

A.3.4 Modem to User, CDM-625/A Data 'Y' Splitter Cable, (2X) DB-9M → DB-9F

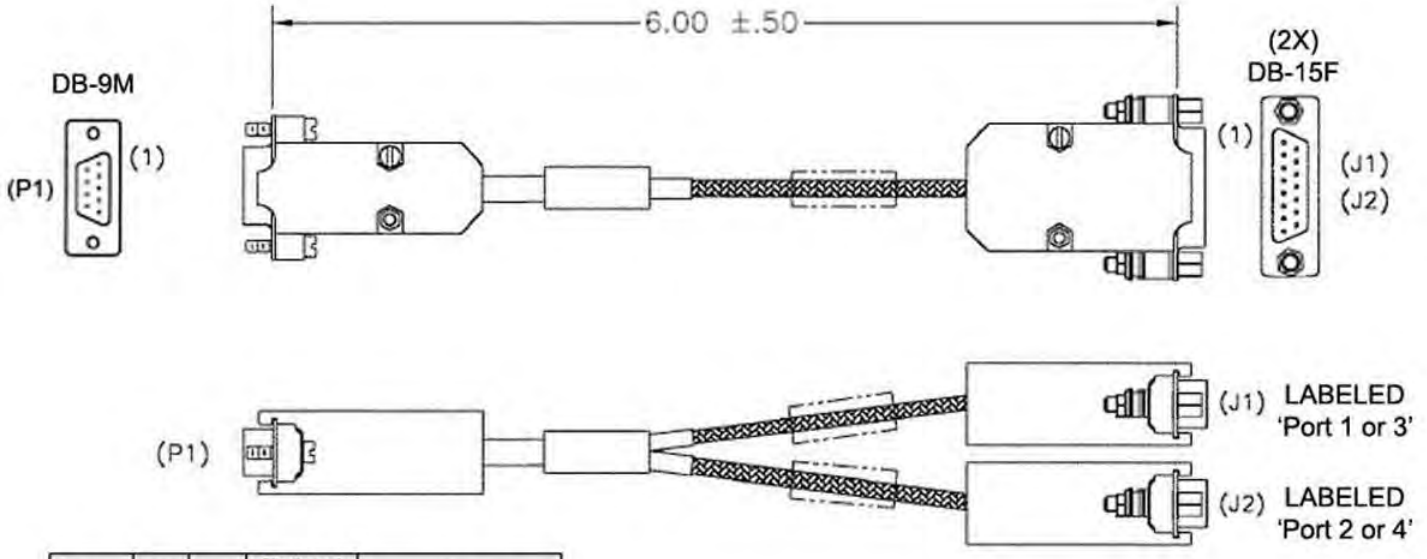


WIRE LIST		
FROM	TO	COMMENTS
J1-1	P2-1, P3-1	TWISTED PAIR
J1-6	P2-6, P3-6	
J1-2	P2-2, P3-2	TWISTED PAIR
J1-7	P2-7, P3-7	
J1-4	P2-4, P3-4	TWISTED PAIR
J1-8	P2-8, P3-8	
J1-5	P2-5, P3-5	TWISTED PAIR
J1-9	P2-9, P3-9	
J1-3	P2-3, P3-3	SHIELD

Figure A-10. 1:1 User Data 'Y' Splitter Cable (CEFD P/N CA-0000071)

A.3.5 Modem to User, Quad E1 'Y' Splitter Adapter Cable, (2X) DB-15F → DB-9M

This optional adapter cable may be purchased from Comtech EF Data to adapt the Balanced G.703 or Auxiliary G.703 DB-9F modem connections to a DB-15F connector pair. The DB-9M end of this cable plugs into the 'To User' connector side (DB-9F) of the CA-0000071 'Y' Splitter cable shown in **Figure A-8**.

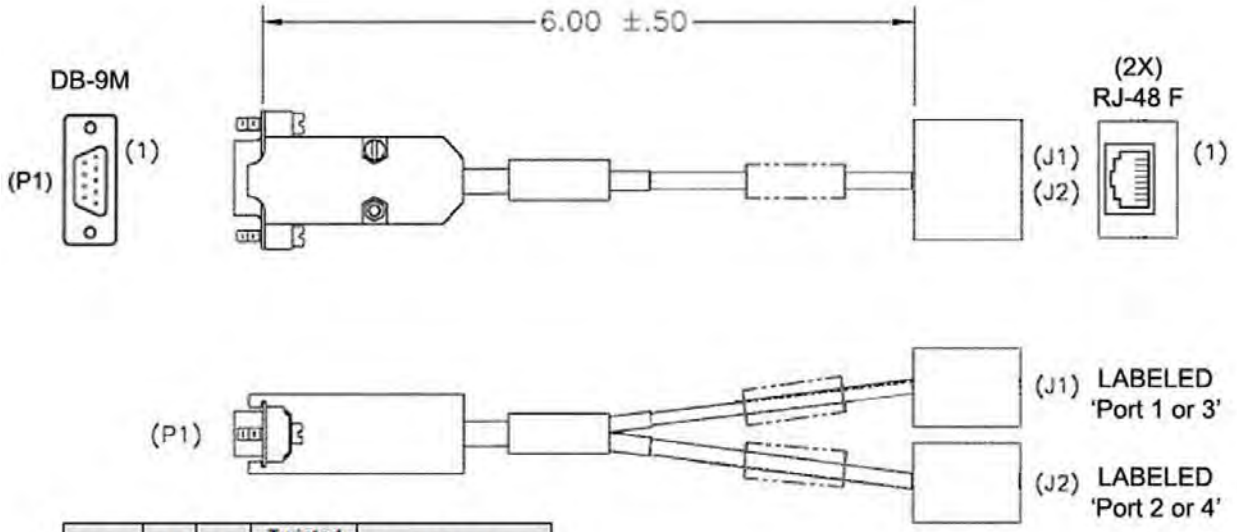


P1	J1	J2	Twisted Pair	Signal Function
5	9		X	Port 1 or 3 Tx In +
9	1			Port 1 or 3 Tx In -
4	11		X	Port 1 or 3 Rx In +
8	3			Port 1 or 3 Rx In -
7		9	X	Port 2 or 4 Tx In +
2		1		Port 2 of 4 Tx In -
6		11	X	Port 2 or 4 Rx In +
1		3		Port 2 or 4 Rx In -
3	2	2	-	GND

Figure A-11. 1:1 Quad E1 User Data 'Y' Splitter Adapter Cable (CEFD P/N CA-0000163)

A.3.6 Modem to User, Quad E1 'Y' Splitter Adapter Cable, (2X) RJ-48F → DB-9M

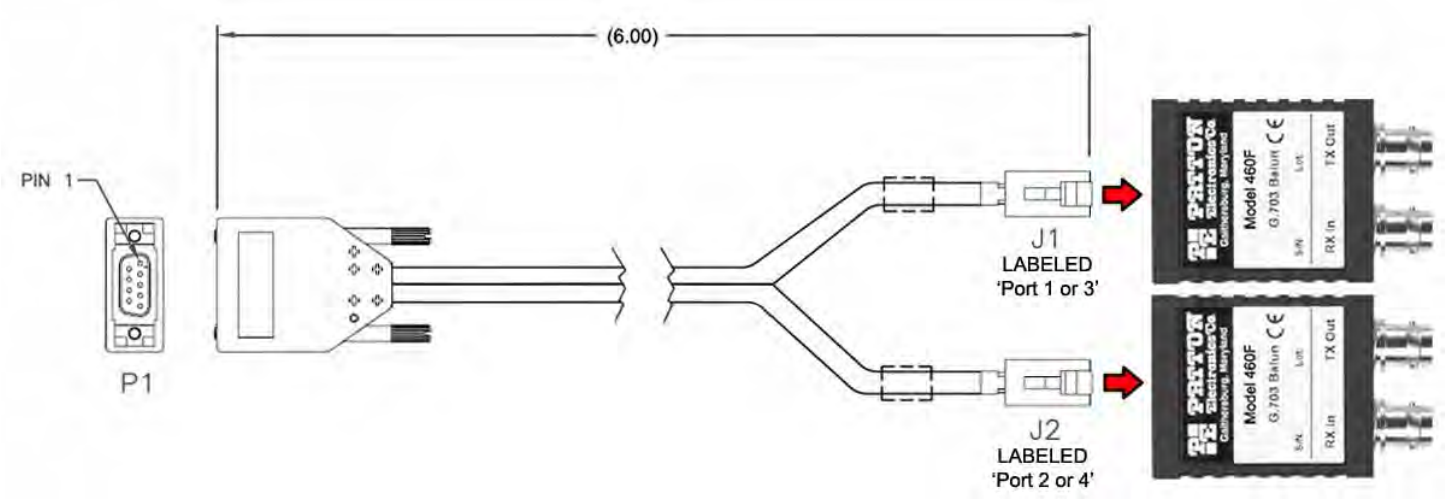
This optional adapter cable may be purchased from Comtech EF Data to adapt the Balanced G.703 or Auxiliary G.703 DB-9F modem connections to a RJ-48F connector pair. The DB-9M end of this cable plugs into the 'To User' connector side (DB-9F) of the CA-0000071 'Y' Splitter cable shown in **Figure A-8**.



P1	J1	J2	Twisted Pair	Signal Function
5	1		X	Port 1 or 3 Tx In +
9	2			Port 1 or 3 Tx In -
4	4		X	Port 1 or 3 Rx In +
8	5			Port 1 or 3 Rx In -
7		1	X	Port 2 or 4 Tx In +
2		2		Port 2 of 4 Tx In -
6		4	X	Port 2 or 4 Rx In +
1		5		Port 2 or 4 Rx In -
3	3	3	-	GND

Figure A-12. Quad E1 User Data 'Y' Splitter Adapter Cable (CEFD P/N CA-0000164)

A.3.7 Modem to User, Quad E1 'Y' Splitter Adapter Cable Kit (KT-0000122)

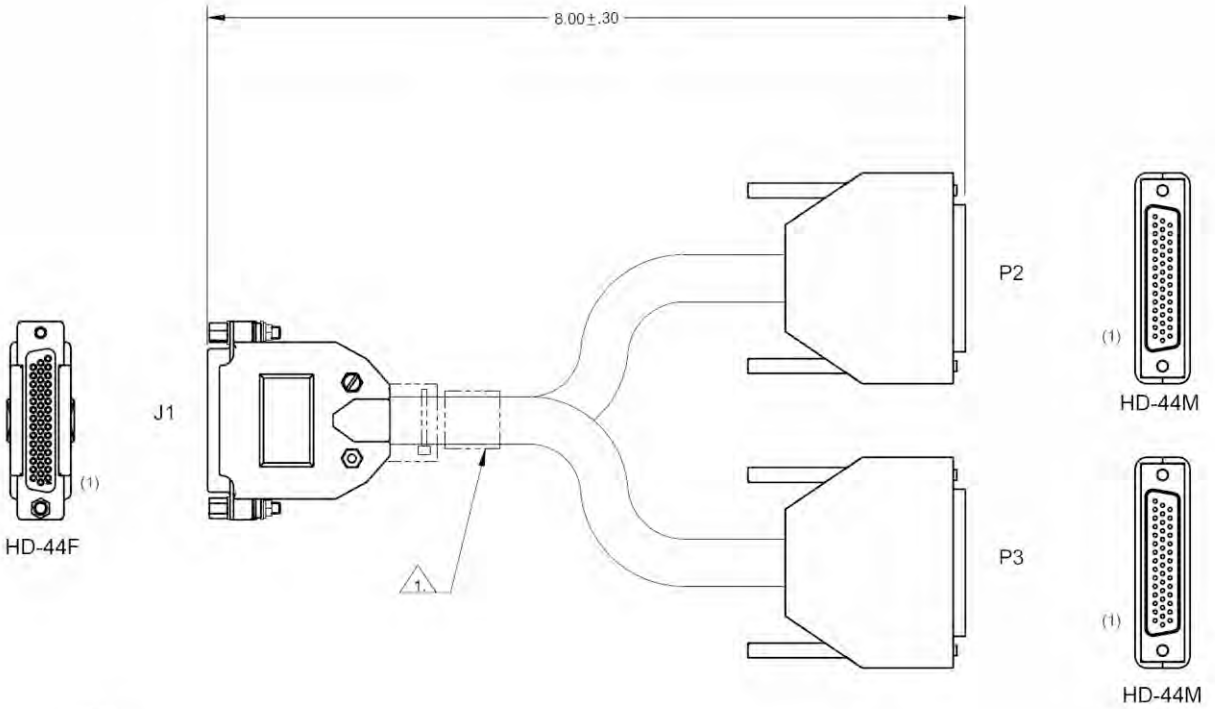


KT-0000122 Quad E1 Balanced/Unbalanced Adapter Kit		
QTY	CEFD P/N	DESCRIPTION
1	CA-0000347	'Y' Cable Assy: DB-9M → 2X RJ-48 Male
2	502-0532-001	Bolun Adapter, 2X RJ-48 Female → 2X BNC 75Ω Female

CA-0000347 Connector Pinouts						
P1 PINOUTS					J1/ J2 TYPICAL WIRE CHART	
P1	J1	J2	Twisted Pair	Signal Function	PIN	WIRE COLOR
5	1		X	Port 1 or 3 Tx In +	1	WHITE / ORANGE STRIPE
9	2			Port 1 or 3 Tx In -	2	ORANGE
4	4		X	Port 1 or 3 Rx In +	3	WHITE / GREEN STRIPE
8	5			Port 1 or 3 Rx In -	4	BLUE
7		1	X	Port 2 or 4 Tx In +	5	WHITE / BLUE STRIPE
2		2		Port 2 of 4 Tx In -	6	GREEN
6		4	X	Port 2 or 4 Rx In +	7	WHITE / BROWN STRIPE
1		5		Port 2 or 4 Rx In -	8	BROWN
3	3	3	–	GND		

Figure A-13. Quad E1 User Data 'Y' Splitter Adapter Cable Kit (CEFD P/N KT-0000122)

A.3.8 Modem to User, Overhead User Data 'Y' Splitter Cable, (2X) HD-44M → HD-44F



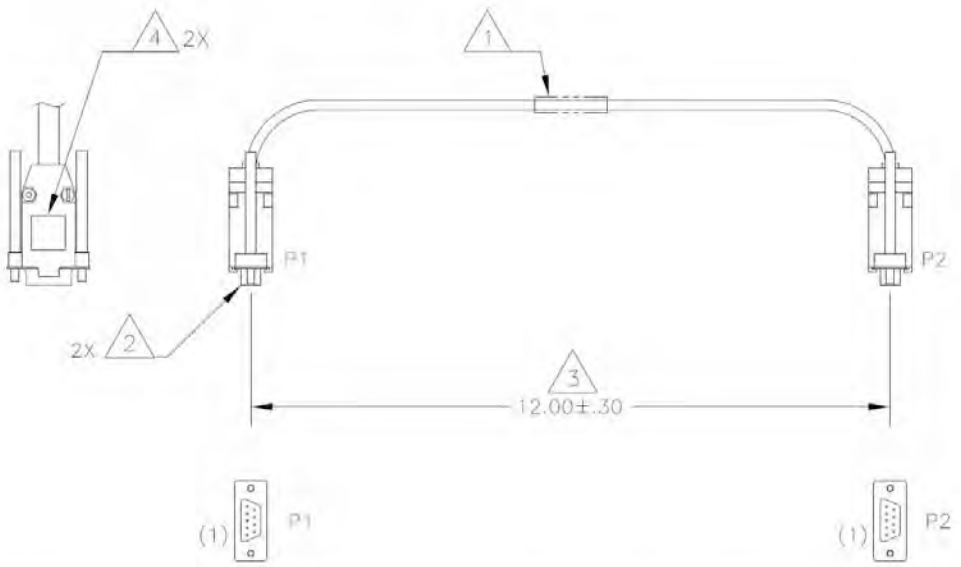
NOTES:

1. PERMANENTLY MARK PART NUMBER, REVISION AND MFG IDENT IN .12 HIGH CHARACTERS APPROXIMATELY WHERE SHOWN. APPLYING AROUND ONE CABLE IS ACCEPTABLE.
2. INSTALL CONNECTORS AND HARDWARE IAW MANUFACTURER'S SPECIFICATIONS AND INSTRUCTIONS.
3. ALL MATERIALS TO BE ROHS COMPLIANT.

WIRE LIST		
FROM	TO	COMMENTS
J1-1	P2-1, P3-1	–
J1-31	P2-31, P3-31	–
J1-2	P2-2, P3-2	–
J1-17	P2-17, P3-17	–
J1-3	P2-3, P3-3	–
J1-33	P2-33, P3-33	–
J1-4	P2-4, P3-4	–
J1-19	P2-19, P3-19	–
J1-5	N/C	–
J1-6	P2-6, P3-6	TWISTED PAIR
J1-36	P2-36, P3-36	
J1-7	P2-7, P3-7	TWISTED PAIR
J1-22	P2-22, P3-22	
J1-8	P2-8, P3-8	–
J1-23	P2-23, P3-23	–
J1-9	P2-9, P3-9	–
J1-39	P2-39, P3-39	–
J1-10	P2-10, P3-10	–
J1-25	P2-25, P3-25	–
J1-11	P2-11, P3-11	–
J1-41	P2-41, P3-41	–
J1-12	P2-12, P3-12	TWISTED PAIR
J1-27	P2-27, P3-27	
J1-13	P2-13, P3-13	TWISTED PAIR
J1-43	P2-43, P3-43	
J1-14	P2-14, P3-14	TWISTED PAIR
J1-29	P2-29, P3-29	
J1-15, J1-16, J1-37	P2-15, P2-16, P2-37 P3-15, P3-16, P3-37	–
J1-18	P2-18, P3-18	–
J1-32	P2-32, P3-32	–
J1-20	P2-20, P3-20	–
J1-34	P2-34, P3-34	–
J1-21	P2-21, P3-21	TWISTED PAIR
J1-35	P2-35, P3-35	
J1-24	P2-24, P3-24	–
J1-38	P2-38, P3-38	–
J1-26	P2-26, P3-26	–
J1-40	P2-40, P3-40	–
J1-28	P2-28, P3-28	TWISTED PAIR
J1-42	P2-42, P3-42	
J1-30	P2-30, P3-30	TWISTED PAIR
J1-44	P2-44, P3-44	

Figure A-14. Overhead User Data 'Y' Splitter Cable (CEFD P/N CA-0000070)

A.3.9 Modem to Modem Shielded Multi-drop CnC® Plus, CDM-625/A 1:1 Cable, DB-9M → DB-9M



WIRELIST			
FROM	TO	COLOR	PAIR
P1-2	P2-2	BLU	X
P1-6	P2-6	BLK	
P1-3	P2-3	RED	X
P1-7	P2-7	BLK	
P1-4	P2-4	GRN	X
P1-8	P2-8	BLK	
P1-5	P2-5	WHT	X
P1-9	P2-9	BLK	

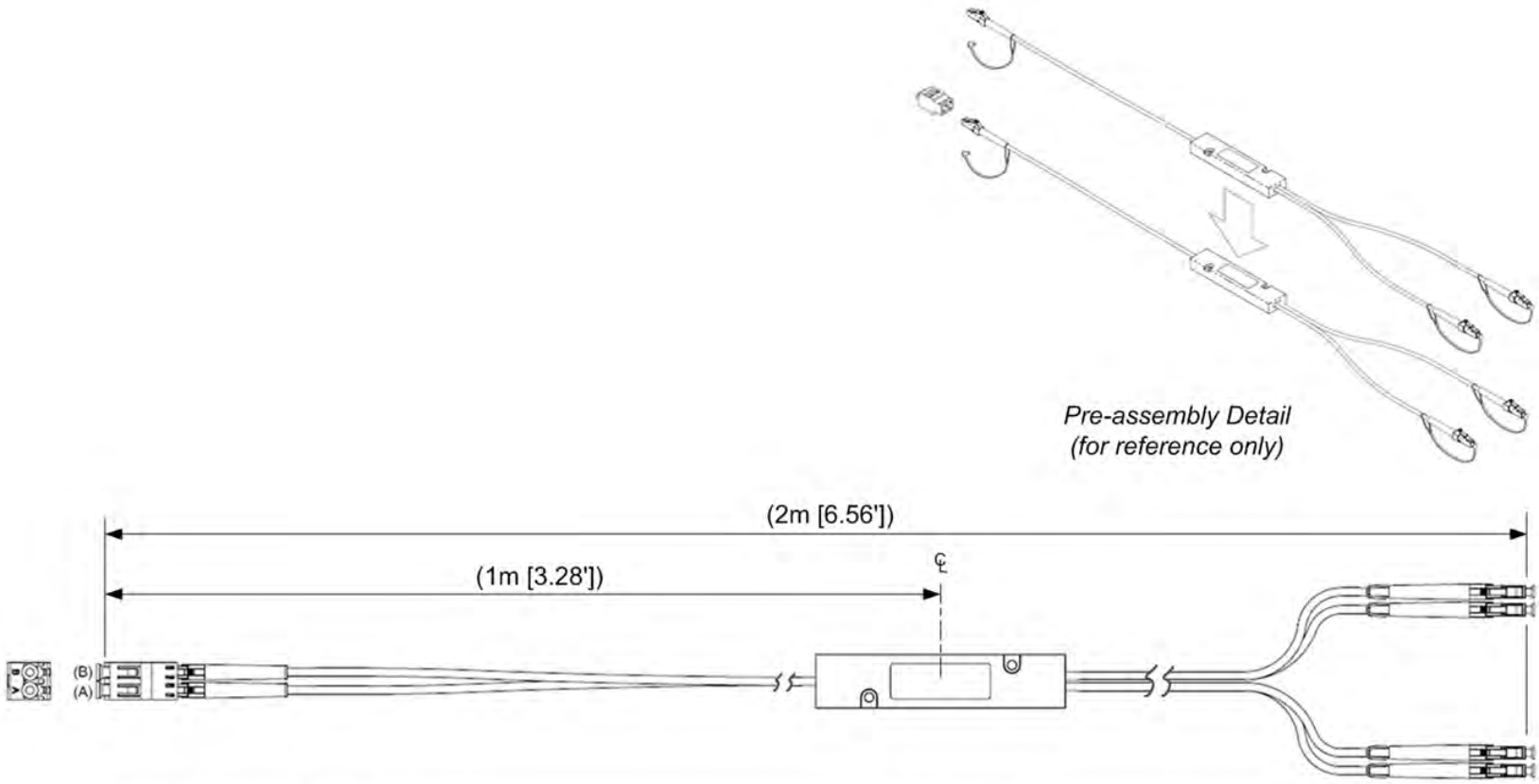
RESISTOR JUMPER WIRING			
FROM	TO	JUMPER	
P1-2	P1-6	ITEM 7	6
P1-3	P1-7	ITEM 7	
P1-4	P1-8	ITEM 7	
P1-5	P1-9	ITEM 7	
P2-2	P2-6	ITEM 7	6
P2-3	P2-7	ITEM 7	
P2-4	P2-8	ITEM 7	
P2-5	P2-9	ITEM 7	

NOTES:

1. PERMANENTLY MARK PART NUMBER, REVISION AND MFG IDENT IN MINIMUM .06 HIGH CHARACTERS APPROXIMATELY WHERE SHOWN.
2. INSTALL CONNECTORS IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS.
3. DIMENSION SHOWN IS BETWEEN CONNECTORS IN ORIENTATION SHOWN, NOT LENGTH OF WIRE.
4. APPLY CONNECTOR DESIGNATION TO LABEL IN .12 HIGH CHARACTERS, COLOR BLACK, USING PERMANENT MARKING, LOCATE APPROXIMATELY WHERE SHOWN.
5. ALL MATERIALS TO BE RoHS COMPLIANT IN ACCORDANCE WITH DIRECTIVE 2002/95/EC.
6. COVER RESISTORS WITH EPOXY TO PREVENT RESISTOR LEADS FROM SHORTING TO CONNECTOR HOOD OR NEIGHBORING RESISTORS. EPOXY SHOULD BE APPLIED TO ALSO ALLOW CONNECTOR HOOD TO BE ASSEMBLED TO CONNECTOR.

Figure A-15. Modem to Modem Shielded Multi-drop CnC® Plus, CDM-625/A 1:1 Cable (CEFD P/N CA-0000276)

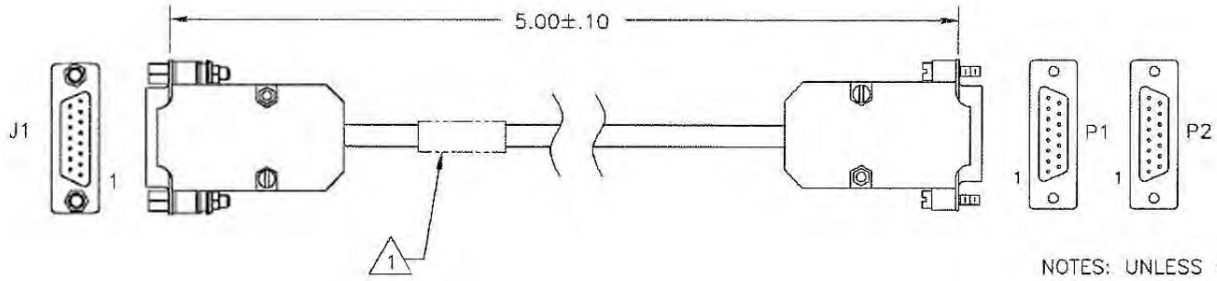
A.3.10 Modem to User, Optical Gigabit Ethernet Single-Mode OR Multi-Mode Cable Assemblies, (2X) Type 'LC' → (4X) Type 'LC'



CEFD P/N	Description	Comments
CA-0000560	'Y' Cable Assy – RoHS-Compliant, Optical Coupler (Single-Mode), 2m (6.56'), Type 'LC' Connectors	For CDM-750 Single-Mode Optical Gigabit Ethernet Interface (Note – cables are **YELLOW**)
CA-0000559	'Y' Cable Assy – RoHS-Compliant, Optical Coupler (Multi-Mode), 2m (6.56'), Type 'LC' Connectors	For CDM-750 Multi-Mode Optical Gigabit Ethernet Interface (Note – cables are **ORANGE**)

Figure A-16. Optical Gigabit Ethernet User Data Cable Assembly (See Table for CEFD P/N)

A.3.11 Modem to User, G.703 Balanced User Data 'Y' Splitter Cable, (2X) DB-15M → DB-15M



WIRE LIST				
FROM	TO	TO	SIGNAL	PAIR
J1–3	P1–3	P2–3	OUT+	X
J1–11	P1–11	P2–11	OUT–	
J1–1	P1–1	P2–1	IN+	X
J1–9	P1–9	P2–9	IN–	

NOTES: UNLESS OTHERWISE SPECIFIED

1. APPLY CABLE PART NUMBER AND THE BOM REV LETTER TO LABEL, ITEM 5, IN .12 HIGH CHARACTERS, USING PERMANENT MARKING, COLOR BLACK, LOCATE APPROXIMATELY WHERE SHOWN.
2. STRIP AND/OR TIN WIRES AS REQUIRED FOR INSTALLING TERMINALS OR CONNECTORS USING MANUFACTURER'S INSTALLATION PROCEDURE.
3. ALL WIRE TERMINATIONS SHALL HAVE A MINIMUM OF .25 INCH OF HEAT SHRINK, ITEM 3, OVER EACH SOLDER JOINT. SEE DETAIL A.
4. FOLD BACK FOIL, BRAID AND DRAIN FROM CABLE, ITEM 6, OVER GROMMET AND SEAL WITH COPPER TAPE, ITEM 4, AS SHOWN IN DETAIL B.

Figure A-17. G.703 Balanced User Data 'Y' Splitter Cable (CEFD P/N CA/WR10522-1)

A.3.12 Modem to User, HSSI User Data 'Y' Splitter Cable, (2X) HD-50M → HD-50F

FROM		TO	SIGNAL	COLOR	PAIR
			GND	DRAIN	
P1-1	P1-1	P2-1	SIG GND	BLK	X
P1-26	P1-26	P2-26		RED	
P1-2	P1-2	P2-2	RT	BLK	X
P1-27	P1-27	P2-27		WHT	
P1-3	P1-3	P2-3	CA	BLK	X
P1-28	P1-28	P2-28		GRN	
P1-4	P1-4	P2-4	RD	BLK	X
P1-29	P1-29	P2-29		BLU	
P1-5	P1-5	P2-5	OPEN	BLK	X
P1-30	P1-30	P2-30		YEL	
P1-6	P1-6	P2-6	ST	BLK	X
P1-31	P1-31	P2-31		BRN	
P1-7	P1-7	P2-7	SG	BLK	X
P1-32	P1-32	P2-32		ORG	
P1-8	P1-8	P2-8	TA	RED	X
P1-33	P1-33	P2-33		WHT	
P1-9	P1-9	P2-9	TT	RED	X
P1-34	P1-34	P2-34		GRN	
P1-10	P1-10	P2-10	LA	RED	X
P1-35	P1-35	P2-35		BLU	
P1-11	P1-11	P2-11	SD	RED	X
P1-36	P1-36	P2-36		YEL	
P1-12	P1-12	P2-12	LB	RED	X
P1-37	P1-37	P2-37		BRN	
P1-13	P1-13	P2-13	SG	RED	X
P1-38	P1-38	P2-38		ORG	
P1-14	P1-14	P2-14	OPEN	GRN	X
P1-39	P1-39	P2-39		WHT	
P1-15	P1-15	P2-15	OPEN	GRN	X
P1-40	P1-40	P2-40		BLU	
P1-16	P1-16	P2-16	OPEN	GRN	X
P1-41	P1-41	P2-41		YEL	
P1-17	P1-17	P2-17	OPEN	GRN	X
P1-42	P1-42	P2-42		BRN	
P1-18	P1-18	P2-18	OPEN	GRN	X
P1-43	P1-43	P2-43		ORG	
P1-19	P1-19	P2-19	SIG GND	WHT	X
P1-44	P1-44	P2-44		BLU	
P1-20	P1-20	P2-20	OPEN	WHT	X
P1-45	P1-45	P2-45		YEL	
P1-21	P1-21	P2-21	OPEN	WHT	X
P1-46	P1-46	P2-46		BRN	
P1-22	P1-22	P2-22	OPEN	WHT	X
P1-47	P1-47	P2-47		ORG	
P1-23	P1-23	P2-23	OPEN	BLU	X
P1-48	P1-48	P2-48		YEL	
P1-24	P1-24	P2-24	OPEN	BLU	X
P1-49	P1-49	P2-49		BRN	
P1-25	P1-25	P2-25	SIG GND	BLU	X
P1-50	P1-50	P2-50		ORG	

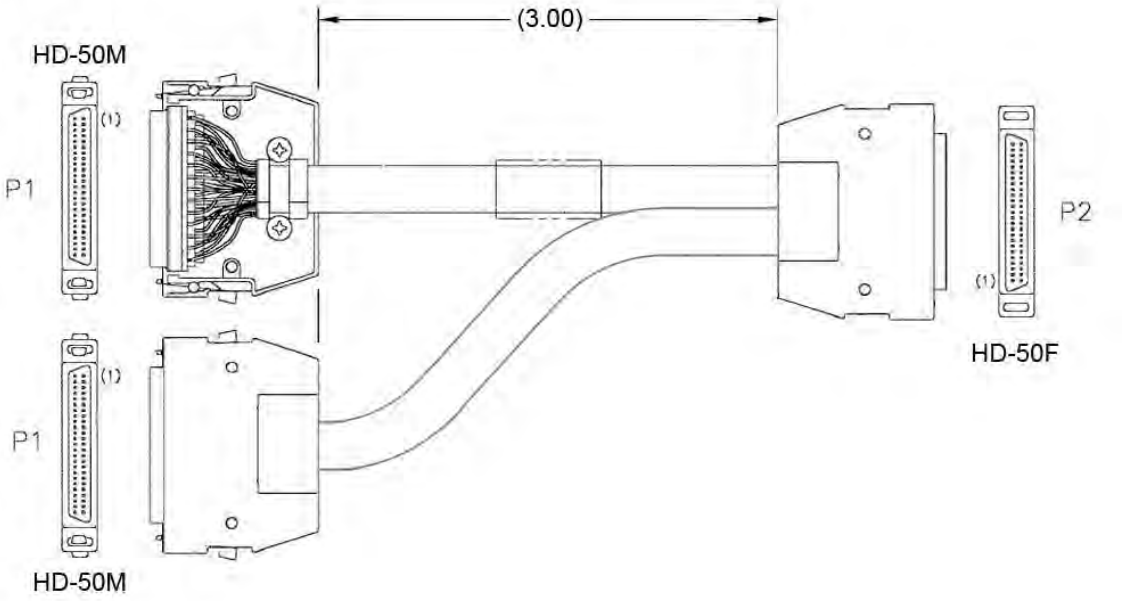
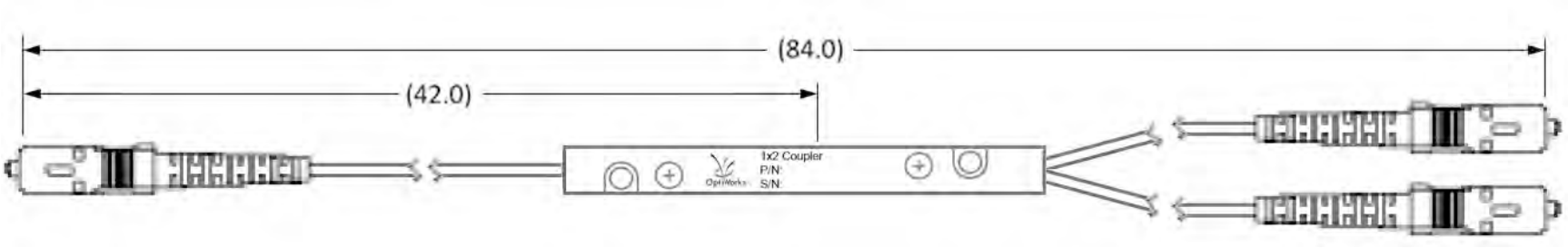


Figure A-18. HSSI User Data 'Y' Splitter Cable (CEFD P/N PP/SC3523)

A.3.13 Modem to User, OC-3 Single-Mode OR Multi-Mode Cable Assemblies, Type 'SC/UPC' → (2X) Type 'SC/UPC'



CEFD P/N	Description	Comments
PP/CPS2A12501	'Y' Cable Assy – RoHS-Compliant, Optical Coupler (Single- or Multi-Mode), 7', Type 'SC/UPC' Connectors	For CDM-700 Single-Mode OC-3 Interface; Cables are YELLOW
PP/CPM6A1250	'Y' Cable Assy – RoHS-Compliant, Optical Coupler (Single- or Multi-Mode), 7', Type 'SC/UPC' Connectors	For CDM-700 Multi-Mode OC-3 Interface; Cables are ORANGE

Figure A-19. OC-3 User Data Cable Assembly (See Table for CEFD P/N)

2114 WEST 7TH STREET TEMPE ARIZONA 85281 USA
480 • 333 • 2200 PHONE
480 • 333 • 2161 FAX